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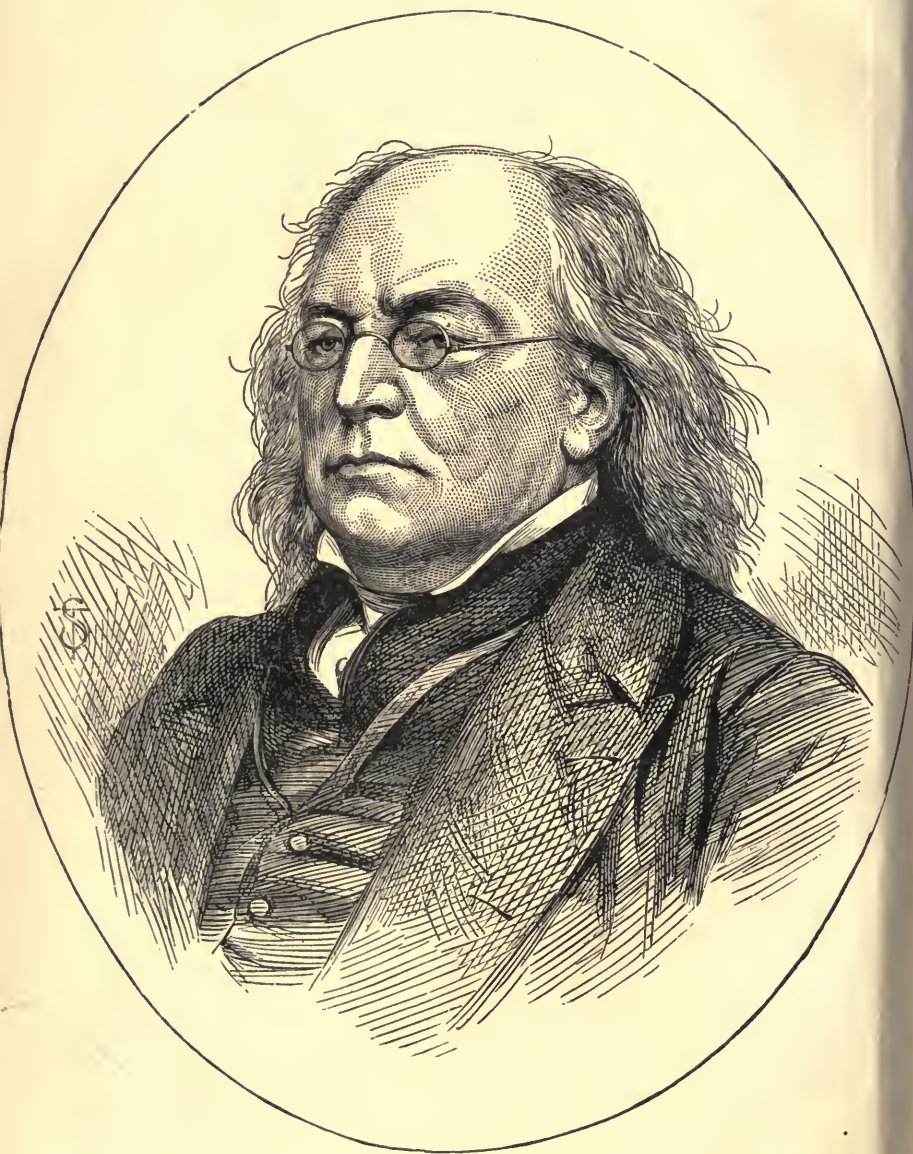




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THE REV. M. J. BERKELEY, M.A.

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A MONTHLY RECORD OF

CRYPTOGAMIC BOTANY

AND ITS LITERATURE.

EDITED BY M. C. COOKE, M.A.

*Author of "Handbook of British Fungi," "Rust, Smut, Mildew, and
Mould," &c., &c.*

VOL. I.

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P R E F A C E .

THE completion of the first volume of an English Journal, specially devoted to Cryptogamic Botany, enables us to congratulate our readers and ourselves upon the achievement of a task which many friends believed to be impossible. It is, nevertheless, an accomplished fact that "Grevillea" has reached its twelfth number, and its promoters are preparing for another year's campaign. If our subscribers and supporters will but continue their aid, this also we hope to accomplish. The complaint which some have urged, that the Journal is too scientific, will, we hope, be speedily removed, not so much by any considerable alteration in the character of the Journal, as by the assiduity of its readers themselves, whereby increased knowledge and experience will bring to its perusal minds more receptive, because better prepared. A popular journal was never intended, but one which should become valuable—nay, *indispensable*—to students and adepts in the branches of Botany to which it is devoted. That it has hitherto been too exclusively devoted to Fungi and Lichens is scarcely the fault of the Journal, but results from the fact that these have been less studied than the higher Cryptogamia, and more was necessary to be done to keep pace with the discovery of new species, or the better illustration of old ones. Now that the additions to British Fungi, discovered since the appearance of the "Handbook of British Fungi," have been recorded, and the descriptions furnished, there will be more of our very limited space left free for Bryologists and Algalogists to describe their additions, and also for communications less connected with systematic than physiological Botany. It could scarcely be expected that we should secure the co-operation of all Cryptogamists

PREFACE.

within the short period of twelve months. Many very reasonable excuses can be made for those who may not be ready at a brief notice to espouse a new cause, or support a new venture ; but we hope that when we have demonstrated to them that our Journal has become established, having entered upon its second year, these excuses will vanish. To all who have assisted us so liberally and freely in the past, our thanks are due, not forgetting those who, by subscribing their names, gave us encouragement to venture upon an undertaking which seemed to promise only great losses and no profits. Finally, we commend ourselves and our work to all British Botanists, and urge them, for the sake of so small an annual sum, not to hesitate in giving us their support. It will be an honour to them if they enable us to continue, and even to enlarge and improve a journal of this character, and prove that Britain as well as Germany can sustain a Cryptogamic Journal. Increased support alone will enable us to augment the number of pages, and continue coloured illustrations as hitherto. Our success has been great, and we rely upon the good fellowship of our Botanical and Microscopical friends to make it greater still. The best road to improvement will lie through an augmented list of subscribers.



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Plate XI.—Inserted in error by the Binder; it belongs to the next volume (No. 13), to which subscribers are requested to transfer it.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY,
AND ITS LITERATURE.

 O the memory of one of the most worthy of British Cryptogamists is dedicated this little monthly record of Cryptogamic Botany. With some diffidence it has been commenced; but with the united support of all students in the different orders its career may be a successful and useful one. What it shall become depends chiefly on the amount of support it may receive. The intention of its projectors is to furnish, month by month, descriptions in English of new species discovered in the British Islands, and to record the habitats of rare or interesting forms, for which purpose communications are solicited; to furnish a record of the literature; and, as far as space permits, descriptions of Exotic species, especially those of the British Colonies and dependencies, and the United States of America, or wherever the English language is spoken. Although the space is limited, it is hoped that structural and physiological subjects will receive attention, and a space will be devoted to the Queries of Correspondents and announcements of desiderata and exchanges. Illustrations will depend, both in quality and quantity, upon the number of subscribers; but it is hoped that at least one plate, sometimes coloured, will accompany each number. It can scarce be expected that such a work will at once assume the character it is desired. Some few months must be expected to elapse before all those who may be interested in Diatomaceæ, Desmids, Lichens, Mosses, or multicellular Algæ will find, as well as those interested in Fungi, that each of these branches are intended to be equally cared for, and illustrated. With patience on the part of subscribers, and perseverance on the part of the Editor, it is hoped that, though small and unpretending, "Grevillea" will at least be useful, and not unworthy of the name it bears.

NEW-YORK FUNGI.

Described by CHARLES H. PECK.

The following new species, found in the State of New York, U.S., are described by Charles H. Peck, in Appendix C to the "Twenty-third Report of the Regents of the University on the New York State Cabinet of Natural History for the year 1869."—(*Albany, N. Y.* 1872.)

Agaricus (*Lepiota*) *Americanus*. *Peck.*—Pileus convex, distinctly umbonate, squamose, with the margin obscurely striate; gills free; stem slender, smooth, annulate, stuffed or hollow, gradually enlarged below into a long, subventricose, bulb-like base; ring thin, subpersistent, fixed.—*Report, p. 71.*

Grassy ground by road sides. August. Buffalo.

Height 3 in. to 5 in., breadth of pileus $1\frac{1}{2}$ -3 in. The whole plant becomes of a dull pinkish red in drying.

Agaricus (*Tricholoma*) *albo-flavidus*. *Peck.*—Pileus at first convex, with the margin incurved, then expanded, or slightly depressed, moist, smooth, even white, in exposed places becoming yellowish; gills close, narrow, thin, emarginate and decurrent with a tooth; stem whitish, equal, solid, striato-fibrillose, with a thin tough cuticle.—*Report, p. 75.*

Ground in woods and open fields. Sandlake and North Elba. August.

Height 3-4 in.; breadth of pileus 2-3 in.; stem about 3 lines thick. The pileus is sometimes slightly and broadly umbonate.

Agaricus (*Clitocybe*) *carnosior*. *Peck.*—Pileus thick, fleshy, obconic, at first convex, then plane or slightly depressed, subumbonate, brown, the margin at first involute, at length expanded, thin; gills white, not crowded, some of them forked; stem concolorous with the pileus, fibrillose, slightly tapering upwards.—*Report, p. 76.*

Pine woods. West Albany and Sandlake. Sept.—Oct.

Height 2-4 in., breadth of pileus 1-3 in., stem 3-6 lines thick. The flesh is moist, soft, and white, sometimes caespitose. Taste pleasant.

Agaricus (*Clitocybe*) *Adirondackensis*. *Peck.*—Pileus thin, submembranaceous, infundibuliform; margin decurved, nearly smooth, hygrophanous, white, disc often darker; gills white, very narrow, scarcely broader than the thickness of the flesh of the pileus, crowded, long, decurrent, subarcuate, some of them forked; stem slender, subequal, not hollow, whitish, mycelio-thickened at the base.—*Report, p. 77.*

Amongst leaves in woods. August.

The gills are sometimes tinged with yellow, margin of pileus occasionally wavy.

Agaricus (Clitocybe) poculum. Peck.—Closely related to *A. Adirondackensis*, being of the same size and shape, but differing in being of a greyish-brown colour, having the gills less crowded, twice as broad, and darker coloured.—*Report*, p. 77.

Woods. North Elba and West Albany. Aug.—Oct.

Agaricus (Collybia) Familia. Peck.—Cæspitose. Pileus thin, hemispherical or convex, smooth, whitish, often tinged with yellow, disc darker; gills narrow, crowded, reaching the stem, rounded at the inner extremity, almost free; stem slender, white, smooth, hollow.—*Report*, p. 80.

On old logs. Adirondack Mts. August.

Height 2-3 in.; pileus $\frac{1}{2}$ to 1 in. broad; stem 1 line thick; disc clouded with brown. The plant becomes dark coloured in drying.

Agaricus (Mycæna) prælongus. Peck.—Gregarious. Pileus at first subcylindrical, then narrowly conical, inclining to campanulate, striate, blackish-brown, with a plumbeous or leaden tint; gills narrow, white, uncinatè, and slightly decurrent-toothed; stem very long, firm, smooth, hollow, paler than the pileus, generally tinged with red, villous at the base.—*Report*, p. 81.

Sphagnous marshes. Sandlake. June.

Height 5-7 in.; pileus 4-8 lines. The pileus becomes paler in drying, and the striæ disappear.

Agaricus (Mycæna) latifolius. Peck.—Gregarious. Pileus convex, rarely somewhat umbonate, striatulate, greyish-brown; gills white, broad, uncinatè, decurrent-toothed; stem slender, smooth, hollow, sub-concolorous, white-villous at the base.—*Report*, p. 82, t. 6, f. 8-14.

Under pine trees. Center. October.

Height 1-1 $\frac{1}{2}$ in.; breadth of pileus 4-6 lines; stem 5 lines thick. A small species with broad gills, growing amongst pine leaves.

Agaricus (Mycæna) paluster. Peck.—Pileus convex, becoming expanded, umbonate, striatulate, greyish-brown; gills not uncinatè, rather broad, subventricose, nearly free, sordid white; stem slender, smooth, hollow, equal, or slightly narrowed upward, villous at the base, pallid.—*Report*, p. 82, t. 5, f. 6-11.

Growing on *Sphagnum* in Cranberry marshes. Sandlake. June.

Height 3-4 in.; breadth of pileus 5-9 lines. Umbo small and sub-acute. Pileus becomes of a whitish grey in drying, and appears to be covered with numerous whitish fibrils.

Agaricus (Mycæna) pulcherrimus. Peck.—Gregarious. Pileus subcampanulate or convex, rarely subumbonate, striatulate, dull yellow, disc a little darker; gills broad, subventricose, attached to the stem, not uncinatè, yellowish; stem slender, hollow, concolorous, white—villous at the base.—*Report*, p. 83.

Under pine trees. Center. October.

Height 1-1 $\frac{1}{2}$ in.; breadth of pileus 3-5 lines. Related to *A. acicula*, but that has a smaller scarlet pileus.

Agaricus (Mycæna) subincarnatus. *Peck.*—Gregarious. Pileus hemispherical, convex or expanded, striatulate, of a pale yellow, or flesh-coloured hue, becoming whitish; gills subincarnate, uncinatè, decurrent-toothed; stem slender, hollow, white—villous at the base.—*Report, p. 83.*

Under pine trees. Center and Sandlake. October.

Height 1-1½ in.; breadth of pileus 3-6 lines.

Agaricus (Omphalia) oculus. *Peck.*—Pileus thin, convex, umbilicate, generally with a small umbo, or papilla in the umbilicus, minutely squamulose, dingy white, umbilicus blackish-brown; gills white, narrow, close, subarcuate; stem whitish, minutely squamulose, or furfuraceous, hollow, often curved, easily splitting.—*Report, p. 84.*

On prostrate trunks in woods. Adirondack Mts. August.

Height 1-2 in.; breadth of pileus ½-1 in.; stem 1 line thick.

Agaricus (Omphalia) chryseus. *Peck.*—Pileus thin, convex, at length plane, or slightly depressed, umbilicate, striatulate, minutely squamulose; gills not crowded, rather narrow, yellow; stem nearly smooth, stuffed or hollow, sometimes curved.—*Report, p. 85.*

Old logs in woods. Adirondack Mts. August.

Height 1-1½ in.; breadth of pileus ⅔-1 in.; stem 1 line thick. The whole plant is yellow.

Agaricus (Omphalia) scabriusculus. *Peck.*—Pileus thin, broadly convex or expanded, striate, yellow; gills distant, broad, subtriangular, connected by numerous veins, white or pale yellow; stem firm, yellow, minutely squamulose, stuffed or solid.—*Report, p. 85.*

Mossy prostrate trunks in woods. Adirondack Mts. August.

Height 1½-2 in.; breadth of pileus ½-1 in. The numerous connecting veins between the gills give a wrinkled appearance to the margin of the pileus.

Agaricus (Pleurotus) sulfureoides. *Peck.*—Pileus rather thin, fleshy, convex, umbonate, subsquamulose or smooth, sulphur-yellow; gills moderately close, rather broad, rounded or slightly emarginate at the inner extremity, easily separating from the stem, pale yellow; stem firm, equal, slightly fibrillose, stuffed or hollow, generally curved and eccentric, rarely central, a little mealy—tomentose at the top.—*Report, p. 86.*

On old logs in woods. Catskill Mts. October.

Height 1-1½ in.; breadth of pileus 1-2 inches; stem 2-3 lines thick. Becomes paler in drying. The minute scales are brown, but often wanting.

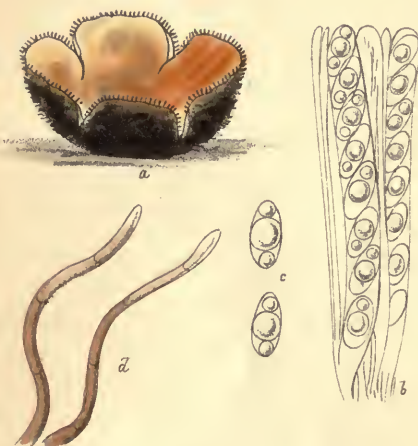


P. hesperidea. C & P.



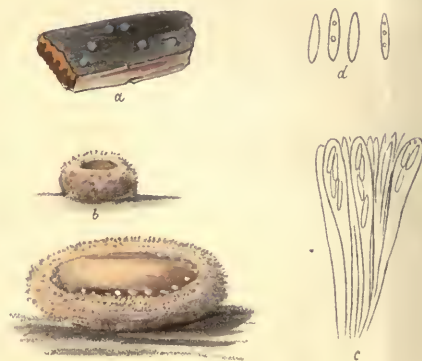
P. floccosa. Schw.

3



P. pellita. C & P.

4



P. subodracea. C & P

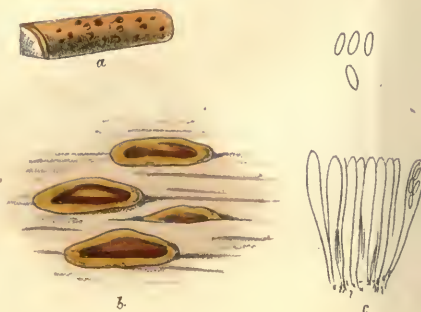
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P. crocetineta. B & C.

M.C.C. del.

6



P. assimilis. C & P.

E. Cooke. del.

PEZIZÆ AMERICANÆ.

By M. C. COOKE and C. H. PECK.

Peziza (Macropodes) hesperidea. *C. & P.*—Stipitate, subsolitary. Cups fleshy, subglobose then patellaform, bright orange within, paler without, smooth, even, $\frac{1}{2}$ –1 in. broad; margin even, smooth; stem slender, straight or flexuose, $1-1\frac{1}{2}$ in. long, clad with white down, especially towards the base, scarcely exceeding 1 line thick, equal, sometimes ending in slightly marked veins at the base of the cup. Asci cylindrical, sporidia narrowly elliptic $\cdot 0009 \times \cdot 0005$ in. ($\cdot 0225 \times \cdot 0125$ m.m.)

Amongst leaves. Goat Island, near Niagara Falls, U.S. (*Peck*, no. 216.)

More slender and graceful than *P. coccinea*, and belonging to a different section, since the cup is smooth. We have no knowledge of *P. occidentalis*, Schw., the cup of which is described as submentose. [Pl. 1, f. i, nat. size.]

Peziza (Sarcoscypha) floccosa. *Schw. North Amer. Fungi*, pp. 172, no. 782.—Asci long, cylindrical, sporidia elliptic $\cdot 0007$ – $\cdot 0008$ in. long ($\cdot 0175$ – $\cdot 02$ m.m.) [Pl. i, f. 2, nat. size.]

Peziza (Dasyscypha) Agassizii. *B. & C.*—Fasciculate, stipitate, erumpent; cups at length open and infundibuliform, externally clothed with a whitish tomentum; disc flattened, orange; stem rather long. Asci subcylindrical, sporidia elliptic or oval, about two-thirds as broad as long.

On bark of *Abies*.

Allied to *P. calycina*, sporidia $\cdot 00025$ – $\cdot 0003$ in. ($\cdot 0065$ – $\cdot 0075$ m.m.) long.

Peziza (Sarcoscypha) pellita. *C. & P.*—Sessile, subglobose then expanded, at length splitting in a radiate manner into four or five irregular lobes; externally brown, densely woolly with septate brown flexuous hairs; disk flesh-coloured, with a rufous tinge. Asci cylindrical; sporidia elliptic; paraphyses slightly clavate at the tips.

On soil covering rocks. Adirondack Mts. U. S. (*C. H. P.* no. 92.)

Cup scarcely an inch broad. Sporidia $\cdot 0007$ – $\cdot 001$ in. ($\cdot 018$ – $\cdot 025$ m.m.) long, $\cdot 0005$ in. ($\cdot 0125$ m.m.) wide. Allied to *P. lanuginosa* and *P. geaster*. [Pl. i, f. 3, a nat. size, d hairs magnified.]

Peziza (Dasyscypha) pulverulenta. *Lib.*—Somewhat crowded, at first globose, then slightly flattened, whitish, externally villose, hairs pulverulent, with glandular orange tips, stem short, thick; asci clavate; sporidia linear, obtuse.—*Libert. exs.* no. 125. *Rabh. Fung. Eur.* no. 514.

On fallen leaves of *Pinus rigida*. New Scotland, N. Y. June. (*Peck*, no. 277.)

Sporidia $\cdot 0004$ in. ($\cdot 01$ m.m.) long. Two species are confounded

by authors under this name, *Helotium pulverulentum*, Awd. Rabh. Fung. Eur. no. 1221, differing considerably from the specimens published by Madame Libert, and F. E. 514.

Peziza (*Dasyscypha*) subochracea. *C. & P.*—Sessile, scattered, subglobose, then expanded, margin incurved, cream-coloured, tomentose; disc darker or bright ochraceous yellow, even; asci cylindrical; sporidia narrowly fusiform or subcylindrical.

On stems of *Rubus odoratus*. Adirondack Mts. July. (*Peck. no. 93.*)

Sporidia .0005 in. (.0125 m.m.) long. [Pl. i, f. 4, *a* nat. size, *b* magnified.]

Peziza (*Calloria*) assimilis. *C. & P.*—Gregarious, erumpent, sub-tremellose, small, dull orange, cups shallow, margin slightly elevated, connivent and retracted when dry; asci subcylindrical, sporidia narrowly elliptic, about one-third as broad as long.

On stems of *Aster punicea*. West Albany. May. (*Peck. no. 278.*)

Allied to *P. fusarioides*. B. & Br. Sporidia .00035 in. (.009 m.m.) long. [Pl. i, f. 6, *a* nat. size, *b* magnified.]

Peziza (*Tapesia*) pruinata. *Schw. Fr. S. M. ii.* 109.—We have failed in all attempts to discover the fruit in this species, and should be glad to learn of better success being achieved by some of our American correspondents.

Peziza (*Mollisia*) vincta. *C. & P.*—Gregarious, sessile, between soft and waxy, irregular, at first subglobose, then expanded, smooth, even, very dark brown, nearly black; disc even, cinereous, very irregular in form and size, attached beneath by delicate brownish hairs, which form a thin arachnoid subiculum, only the margin being free and incurved. Asci subcylindrical, sporidia cylindrical, obtuse, straight or curved.

On old wood. Sandlake, N. Y. Oct. (*Peck. no. 217.*)

Sporidia .0005 in. (.0125 m.m.) long.

Peziza (*Mollisia*) crocitincta. *B. & C.*—Sessile, scattered, soft, globose, then expanded, saffron-yellow, disc paler, externally smooth, slightly channelled. Asci cylindrical. Sporidia very minute, sausage-shaped, with a yellowish tint. *Rav. no. 1730.*

On wood. [Pl. i, f. 5, *a* nat. size, *b* magnified.]

Peziza (*Mollisia*) lacerata. *C. & P.*—Gregarious, globose, then expanded, dark brown, margin coarsely lacerated into subtriangular, irregular teeth, disc cinereous, becoming blackish when dry. Asci subcylindrical, sporidia cylindrico-clavate.

On *Rubus odoratus*. Adirondack Mts. July. (*Peck. no. 94.*)

Similar to *P. escharodes*, B. & Br., except that it is larger, never hairy, and the margin different, sporidia .0005 in. (.0125 m.m.) long.

Peziza (*Mollisia*) Dehnii. *Rabh. Bot. Zeit.* 1843. 12. *Deut. Crypt.*

Flor. no. 2635.—Sporidia narrowly fusiform, straight or curved, often quadriguttulate, .0008 in. (.02 m.m.) long.

On stems and leaves of living *Potentilla argentea*. Albany. June. (*Peck. no. 280.*) New York. (*W. W. Denslow, no. 88.*)

BRITISH FUNGI.

By M. C. COOKE.

Since the publication of the "Handbook of British Fungi" a considerable number of additions have been made. Some of these have already been enumerated or described by Messrs. Berkeley and Broome in the "Annals of Natural History;" others we purpose, from time to time, to describe and illustrate, as far as possible, in this Journal. The following belong to the Order *Coniomycetes*:—

Nemaspora grisea. *Corda.* "Grey Nemaspora."

Perithecia simple, fleshy, white; nucleus white; spores oblong, semi-pellucid, white; tendrils greyish-white, sub-diaphanous, short.—*Corda Ic. iii. f. 68. B. & Br. Ann. N.H. no. 1B10. Libert exs. no. 389.*

On dead twigs. Hatton. May 23, 1867.

Protomyces. *Unger.*—Entophytal. Spores simple, aggregated, always immersed; epispore firm, diaphanous; endochrome granulose, coloured; immersed in the matrix.—*Unger Exanthema t. 5, f. 27. De Bary, Beitrage. Corda Anleitung, p. 8.*

Protomyces Menyanthis. *De Bary.* "Bogbean Protomyces."

Spores aggregated in roundish or confluent patches, immersed in the substance of the leaves, purplish on the surface; spores subglobose, brownish.—*De Bary Brandpilze p. 19. Fckl. Sym. Myc. p. 75. Fckl. exs. no. 260. Cooke exs. no. 295. Berk. in Rabh. F.E. no. 1500.*

In leaves of *Menyanthes trifoliata*.

Protomyces Ari. n. s. "Arum Protomyces."

Spores aggregated in elongated patches in the substance of the leaves and petioles, always covered, globose, simple, brown, endochrome granular, epispore smooth.

In leaves and petioles of *Arum maculatum*, Chichester. May, 1872. (*Dr. Paxton.*)

Æcidium Statices. *Desm.* "Sea lavender cluster cups."

Hypophyllous. Spots subrotund or confluent and irregular, purple; peridia in subrotund circinating clusters, sometimes irregularly disposed on the nerves and petioles, urceolate; margin lacerated, white; spores orange.—*Desm. exs. no. 132. Cooke exs. no. 444.*

On leaves and petioles of *Statices*. June—July. Fleetwood, 1859 (*Rev. A. Bloxam*). Walney Island, 1871 (*C. Bailey*). Near Basingstoke, 1871 (*R. S. Hill*). Near Chichester, 1872 (*F. V. Paxton*).

Æcidium Parnassiae. Grav. "Parnassia Cluster Cups."

Hypophyllous. Spots pallid; peridia in subrotund patches, irregularly disposed, tawny yellow, between urceolate and concave, the margin thick and nearly entire; spores pallid.—*Duby. Bot. Gall. ii. p. 904.*

On leaves of *Parnassia palustris*. Near Glasgow (*Dr. Greville*). The original specimen is in the Edinburgh Herbarium.

LICHENOLOGICAL MEMORABILIA.—No. 1.

By the REV. W. A. LEIGHTON, B.A., F.L.S., F.B.S. Ed.

Pilophoron fibula. Tuck.

This very interesting lichen, which until lately was supposed to be confined to the White Mountains in North America, has been constantly confounded with *Stereocaulon condensatum*, Ach.; but is readily distinguished by the differences in the spores, those of the former being ellipsoid and simple, and those of the latter fusiform, 3-7-septate. I have myself repeatedly gathered it throughout the Snowdonian district, Nant Francon, the Glyders, Aran Mowddu, and in other parts of North Wales, where it occurs in some abundance; but requires careful observation to detect it, from its close growing habit and the minuteness of its fructification. Dr. Nylander, in the appendix to his "*Lichenes Lapponicæ Orientalis*," mentions it as found by M. Th. Simming at Dianovagora, near Lake Onega. And in looking over some lichens in the herbarium of Mr. Horatio Piggot, of Tunbridge Wells, I detected a remarkably fine specimen with magnificently developed fructification, under the name of *St. cereolinum*, which he had collected near the Cuchullin Hills, near Sligachan, Isle of Skye, Scotland. If carefully searched for it may be, no doubt, detected in Alpine and sub-Alpine regions throughout the world. Most of English and Scotch localities given for *St. condensatum* and *cereolinum* will, on more careful research, prove referable to *Pilophoron fibula*. See Leight. Lich. Fl., 2nd ed., pp. 469 and 470.

Morocco Lichens.

Dr. Hooker, of Kew, placed in my hands for examination and determination the lichens which he collected in his expedition to Morocco and the Atlas Mountains, in May, 1871. Though few in number they are very interesting, especially from the locality from whence gathered.

They are as follows:—

Cladonia endiviaefolia, Fr. Tangier and Tetuan, North Morocco.

Alectoria cana, Ach. Beni Hosmar, Tangier, and Tetuan, North Morocco.

Ramalina calicaris, Fr. Tangier and Tetuan, and Ain-el-Hadjar, North Morocco.

Ramalina evernioides, NYL. Ain-el-Hadjar, near Mogadore, North Morocco.

Sticta pulmonacea, ACH. Beni Hosmar, North Morocco.

Physcia parietina, L. ; var. *ectanea*, ACH. Beni Hosmar, North Morocco.

Physcia intricata, DESF. On Argan trees, Djebel Hadid, South Morocco, and near Mogadore.

Physcia villosa, DUB. Safi, South Morocco.

Physcia stellaris, L. ; var. *leptalea*, ACH. Tangier and Tetuan, North Morocco.

Umbilicaria deusta, L. ; var. *mesenteriformis*, WULF. Mount Tezi (10,000 feet), South Morocco, Greater Atlas.

Squamaria lentigera, WEB. Amsmiz (5-6,000 feet), Greater Atlas, South Morocco.

Squamaria cartilaginea, WESTR. Amsmiz, Mount Tezi (10,000 feet).

This lichen is found on our shores, near Barmouth, perhaps under 1,000 feet. It has, therefore, a remarkable range in altitude, which is applicable also to several others of these lichens.

Squamaria melanophthalma, RAM. Mount Tezi.

Placodium murorum, HFFM. Mount Tezi.

Placodium aureum, SCHÆR. Beni Hosmar.

Lecanora chlorophana, ACH. Mount Tezi.

Urceolaria ocellata, D.C. Djebel Hadid, South Morocco, near Mogadore.

Dirina repanda, FR. South Morocco.

Endocarpon Muhlenbergii, ACH. (Syn. 101), Revaia (7-11,000 feet), Great Atlas, South Morocco.

BRYOLOGY.

By ROBERT BRAITHWAITE, M.D., F.L.S., ETC.

The commencement of an English Journal devoted to Cryptogamic Botany must surely engage the attention of all workers in the wide field embraced within the scheme of its operations; and as our opening contribution to the department of Bryology, we offer the latest arrangement of mosses. The well-known merit of the author, and the high character of most of the papers brought before the Society, require no apology for presenting it to the readers of "Grevillea," many of whom might not otherwise have an opportunity of becoming acquainted with it, and we purpose, on a future occasion, to review it more in detail.

This "Moss Picture" will be found in the "Verhandl. Zool. Botan. Gesels. in Wien," vol. xxi., p. 375 (1871).

DAS MOOSBILD. auctore Dr. Ernst Hampe.

SECT. A. SACCOMITRIA.

Archidiaceæ.

Sphagnaceæ.

Andræaceæ.

Bryaceæ.

Mniaceæ. -

a. *Eumniaceæ*.

b. *Polytrichaceæ*.

c. *Buxbaumiaceæ*.

SECT. B. STEGOMITRIA.

1. *ACROCARPI*.

A. *CLEISTOCARPI*.

Phascaceæ.

B. *STEGOCARPI*.

Funariaceæ.

Splachnaceæ.

Pottiaceæ.

Calypereæ.

Leucobryaceæ.

Weisiaceæ.

a. *Fuweisiaceæ*.

b. *Seligeriaceæ*.

c. *Angstræmiaceæ*.

d. *Blindiaceæ*.

Bartramiaceæ.

a. *Meesiaceæ*.

b. *Eubartramiaceæ*.

Grimmiaceæ.

a. *Eugrimmiaceæ*.

b. *Glyphomitriaceæ*.

c. *Orthotrichaceæ*.

2. *CLADOCARPI*.

Fontinalaceæ.

Cryphaeaceæ.

3. *PLEUROCARPI*.

A. *BRACHYCARPI*.

a. *Leucodonteæ*.

b. *Phyllogonieæ*.

c. *Neckeraceæ*.

B. *ORTHOCARPI*.

a. *Fabroniaceæ*.

b. *Pterogoniaceæ*.

c. *Pseudo-Neckeraceæ*.

d. *Euleskeaceæ*.

e. *Daltoniaceæ*.

C. *CAMPTOCARPI*.

a. *Hookeriaceæ*.

b. *Hypnaceæ*.

4. *AMPHICARPI*.

Gamophylleæ.

Heterophylleæ.

Hypophylleæ.

ON A MINUTE NOSTOC WITH SPORES.

By WILLIAM ARCHER.

The appearance of a highly interesting and noteworthy communication from Professor Max Reess conveying a description of certain novel experiments instituted by him on the growth of a *Collema* from the spores, and giving his views as to the bearing thereof as regards *Nostoc*,* which I have only just seen, recalls to my recollection a seemingly remarkable, though isolated example of a not uncommon minute aquatic *Nostoc* brought forward by me at a recent meeting of our Microscopical Club, but not publicly exhibited, from want of time, and since then somehow overlooked to be recorded. I will not attempt on this occasion to give any account of Reess' views, or those of Schwendener, but will reserve my observations thereon for a future communication to this Journal.

* Ueber die Entstehung der Flechte *Collema glaucescens*, Hoffm., durch Aussaat der sporen derselben auf *Nostoc lichenoides*, Vauch. Prof. Max Reess, in Monatsb. der K. Acad. der Wiss. zu Berlin, Oct., 1871, pp. 513.

Professor Reess' is an abstract of the views already propounded by Professor Schwendener as regards the nature of Lichens, who, in his turn, seems possibly to have had suggested to him the working out of some such idea as he has arrived at, by the alternative conclusion put forward by Professor de Bary as one or other being a necessary outcome or result deducible from the existent knowledge of the gelatinous Lichens (Gallertflechten) or the Collemaceæ and allies, and seemingly embracing also Ephebe in his generalisation, which is thus enunciated—"Either the Lichens in question are perfectly developed states of plants whose imperfectly developed forms have hitherto stood amongst the Algæ as the Nostocaceæ and Chroococcaceæ; or the Nostocaceæ and Chroococcaceæ are typical Algæ; they assume the form of Collema, Ephebe, and so forth through certain parasitic Ascomycetēs penetrating into them, spreading their mycelium into the continuously growing thallus, and frequently attached to their phycochrome containing cells."* The former of these hypotheses, as is well known, has many supporters, and, seemingly, a considerable amount—at least, in certain instances—of evidence in its favour. The latter hypothesis, on the other hand, has found, if fewer, even more staunch adherents, most prominent amongst whom are Schwendener and Reess, and is in fact that alluded to as being recently put forward by him, relinquishing the views supported by him in the earlier portion of his elaborate memoir on the Lichen thallus.

The little Nostoc to which I have already alluded, and to which I am desirous of directing attention, is a very minute one, though the dimensions of the subglobose or elliptic fronds vary much. It is rather common in moor and certain bog pools. On account of its small size, therefore, readily capable of compression, and its pellucid character, the elegant arrangement of its tortuously twisted rather large moniliform filaments, is often nicely seen, and this causes it to be a very pretty and favourable illustrative example of its type for examination in its entirety under the higher powers of the microscope. Its minute size calls to mind *Nostoc minimum* (Currey),† but in it the cells are described as quadrate with a sinus at each side, lending a crenate outline to the filaments, and the heterocysts are large, whilst here the cells are orbicular or for a time slightly flattened at the junctions, and the heterocysts are but slightly wider, though longer than the ordinary cells. This plant is probably identical with *Nostoc paludosum* (Kütz.), though as regards anything to be deduced from the heterocysts Kütz. is silent. But the interesting point connected with it is a single example of it having presented indubitable "spores," and precisely similar nature to those in *Sphærozyga*, &c., but with the peculiarity of

* Morphologie u. phys. d. Pilze, Flechten und Myxomyceten—Proff. de Bary, in Hofmeister's Handbuch der Phys. Bot., Bd. ii., p. 291.

† Currey "On Freshwater Algæ," in "Quart. Journ. of Micr. Sci.," vol. vi. (1st ser.), page 216.

these being always placed singly between two heterocysts. The pairs of heterocysts with the intervening spore occurred at just about the same intervals as in ordinary examples occur the isolated heterocysts; the spores large, broadly elliptic, about one-third longer than broad; their diameter more than twice the diameter of the heterocysts, about thrice the diameter of the ordinary cells; the "bright points" of the heterocysts not very conspicuous.



I would explicitly deprecate any supposition that the observation was founded on any mere isolated filament, met with in the same material as the rest of the ordinary examples of this Nostoc around, and assumed by me to have emanated from some of them, and, therefore, possibly that of some other genus.

The filaments were not isolated, but contorted about in quite the ordinary way, were still involved in the parent matrix, which was bounded by the distinct pellicle, or "periderm," generically characteristic, and in all respects, save the remarkable speciality described, this example was absolutely the same as the others in the same gathering; in fact, the little Nostoc was intact. It might be said, possibly, this little plant was rather a Monormia, but the definite periderm to the rounded fronds places a bar to the assumption, and I do not think any observer would see it and pronounce it other than a Nostoc.

In making a drawing for illustration it is of course unnecessary to present more than one spore, with its adjacent heterocysts and a few cells of the filament. To give the total frond and its long, tortuously looped and curved filaments, with their numerous spores and heterocysts, and to convey an idea of the matrix, with the bounding periderm, would have been an unnecessary labour and expense, and to carry it out on the scale of some 400 diameters would have occupied a very considerable space.

The interest which attaches to this example of a spore-bearing Nostoc will be more apparent after reading my observations on Reess' views, which will follow, and which are necessarily excluded here on account of the limited space at my disposal.

Australian Fungi.—Mycologists will be glad to learn that the last number of "The Journal of the Linnean Society" (No. 67, for May), contains a valuable communication by the Rev. M. J. Berkeley, on Australian Fungi. In addition, we may observe that the same number contains a communication by Dr. Dickie on the Marine Algæ of the Island of Saint Helena, and two communications by Dr. S. O. Lindberg on *Mesotus* (Mitten) and *Zoopsis* (Hook and Thom.).

CHICAGO HYDRANT WATER.

From a communication on this subject, by H. H. Babcock, in the second number of "The Lens" (Chicago, U. S.), we extract the following observations :—

"Some species of diatoms, as *Tabellaria fenestrata* and *Fragilaria Crotonensis*, produced in abundance all along the shore of the Lake, are always to be found in the hydrant water. *Surirella splendida*, *Cymatopleura solea*, *Stephanodiscus Niagaræ*, *Asterionella formosa*, and a *Cymbella*, which one may sometimes observe in a shore gathering, are occasionally present. A *Melosira*, identical with that found in small streams flowing into the lake at Glencoe, is often seen; *Pleurosigma attenuatum* more rarely; while *Pleurosigma Spencerii*, *Amphiprora ornata*, and a *Rhizosolenia* are the rarest species.

"In a word, we receive through the hydrants many of the free, unattached forms, known to be produced along the lake shore, and on streams entering the lake to the north of the city, as well as a few species whose origin has not been determined; while the stipitate or otherwise attached forms, as *Gomphonema* and *Synedra*, though growing in abundance in the vicinity, are seldom represented.

"I am led to believe that the streams of Northern Illinois, Wisconsin, and even Northern Michigan, are the source whence we obtain some of the diatoms most rarely observed in the hydrant water, and that these forms, coming within the influence of the southerly current of the lake, are brought as far as the crib which stands within the current, but near its easterly edge. In a gathering made at the mouth of the Carp river, a stream of Northern Michigan, nearly opposite the island of Mackinac, I have found an abundance of *Pleurosigma attenuatum* and *Spencerii*, *Surirella splendida*, and *Amphiprora ornata*. It is probable that other streams in the vicinity, and to the southward of that named, produce the same species, which, specifically light, are borne by the current as far as Chicago, and that the reversal of the course of Chicago river has caused the lake current opposite the city to swerve slightly towards the west, and admitted to the crib the pure water from the deeper, undisturbed part of the lake.

"Whether the river or lake current, or, as I am inclined to believe, both combined, are the source of these organisms, there seems to be no doubt that so long as there is kept up in the river a moderately rapid current from the lake, the city will be provided with water more nearly approaching in purity that at Mackinac and Lake Superior, which is remarkable for its transparency."

RHIZOSOLENIA ERIENSIS.

Rhizosolenia Eriensis. *H. L. Smith.*—Frustules small, compressed, somewhat flattened; not rigidly siliceous, 6-12 times as long as broad; length .003-.006 in. Annuli on the dry frustules conspicuous, apparently interrupted in the middle, and alternate; obscure in fluid or balsam. Frustules finely striated. Bristles nearly as long as the frustules, and, with the calyptra, excentric, lying nearly in a line with one margin of the frustule when the flat side is in view.

Chicago (U.S.) water-supply; very abundant at certain seasons, and very rare at others. Originally noted in Lake Erie, at Cleveland, O.—*S. A. Briggs* in "*the Lens*," for Jan., 1872.

NEW AMERICAN POLYSIPHONIA.

The following species is described as new, by C. H. Peck, in his Report for 1869, just issued.

Polysiphonia subcontorta. *Peck.*—Tufts rigid, 2-3 in. high, loosely entangled, dark red; filaments slender, naked below, alternately, and sub-distantly branched above; branches short, subequal, naked at the base, much branched above, and expanded into a rigid subsquarrose bushy tuft of ramuli, which are subfusiform and more or less curved or contorted; tubes four, surrounding a small central one; articulations of the leading filaments 6-10 times, of the branches 2-4 times their breadth, those of the ramuli shorter than broad; tetraspores in the swollen part of the ramuli.—*Report*, p. 51.

Rocks near low water mark. Long Island Sound, at Greenport and Orient. July.

The filaments are about as thick as hogs' bristles, nearly equal in thickness throughout, constituting a leading stem, with its articulations distinct and very long towards the base, and giving out its branches, which are four or five lines long at intervals of 3-4 lines. The plant becomes blackish in drying, and does not adhere closely to paper. In size, consistency, and coloration this species resembles *P. fastigiata*; but in ramification, number of tubes, length of articulations, etc., it is far removed from that species.

American Desmids.—The seven new species of Desmids described by Dr. Wood in the "Proceedings of the Academy of Natural Sciences," at Philadelphia, are named by him,—*Euastrum multilobatum*, *Euastrum ornatum*, *Arthrodesmus quadridens*, *Staurastrum minutum*, *Staurastrum Lewisii*, *Cosmarium suborbiculare* and *Pleurotenium breve*. Descriptions in Latin, with measurements, will be found in *Hedwigia* for 1872, No. 1, p. 3.

New Hepaticæ.—The following new species of North American Hepaticæ are described by C. F. A. Austin in the Bulletin of the Torrey Botanical Club, for March, 1872:—*Sarcoscyphus Bolanderi*, *Sarcoscyphus Bæckii*, *Scapania Oakesii*, *Jungermannia crenuliformis*, *Jungermannia Wattiana*, *Jungermannia Sullivantiæ*, *Jungermannia Gillmani*, *Sphagnoecetis Macounii*, *Madotheca Bolanderi*, *Madotheca Sullivantii*, *Lejeunia Sullivantiæ*, *Frullania Wrightii*, *Frullania Sullivantiæ*, *Frullania pendula*, and *Fimbriaria violacea*. We regret to see that the "complimentary fever" is raging so strong across the Atlantic; here are eighteen new species, of which no less than twelve have "complimentary" names, the same individual being four times immortalized.

Dimorphic Diatoms.—Last October (1871) I collected in the salt water at Helle Gat, North end of Norfolk Island, a *Melosira*, which was in part *M. nummuloides* and part *M. Borreri*, as Smith defines and figures. I have for some time expected that these two forms were only one species. In September (1871) I collected in a small stream on Union Hill, N. J., *Gomphonema constrictum*, *capitatum*, *acuminatum*, and *cristatum*, all on the same stalk. Also sporangia (?) of *Melosira varians*, different from any I have ever seen before, they are like little "dumb-bells," consisting of two globes united by a short isthmus. *Hydrodictyon utriculatum* is very common around New York.—Arthur M. Edwards, M.D., Newark, N.J.

Alphonse de Brebisson.—The death of this veteran cryptogamist took place at Falaise on the 26th April last, at the advanced age of 74 years. It is with regret that we shall be deprived of his promised assistance, that we make this announcement. Another of the contemporaries of Smith, Greville, and Walker Arnott has finished his course. A large and valuable collection of some thousands of slides of Diatomaceæ, the accumulation of an active life, is to be disposed of by his son, M. René de Brebisson. It is to be hoped that some Microscopical Society, or public institution like the British Museum, will secure the collection in its entirety.

Dr. M. A. Curtis.—The death of the Rev. Dr. M. A. Curtis, of Hillsborough, North Carolina, U.S., leaves a blank in the short list of North American mycologists which we fear will not soon be so efficiently filled up.

Edible Fungi.—The following species are enumerated by C. H. Peck for the State of New York:—*Agaricus cæsius*, Scop.; *Cortinarius cinnamomeus*, Fr.; *Cortinarius castaneus*, Fr.; *Lactarius deliciosus*, Fr.; *Lactarius subdulcis*, Fr.; *Cantharellus cibarius*, Fr.; *Lycoperdon calatum*, Fr.; *Lycoperdon giganteum*, Batsch.; *Boletus luteus*, Linn.; *Boletus flavidus*, Fr.; *Boletus collinitus*, Fr.; *Boletus subtomentosus*, Linn.; *Boletus edulis*, Bull.; *Hydnum imbricatum*, Linn.; and *Helvella Infula*, Schæff.

CRYPTOGAMIC LITERATURE.

MYCOLOGISCHE BERICHTE, by Dr. Hermann Hoffman, Professor of Botany at Giessen. Part iii., for 1871, contains abstracts of contributions to Mycological Literature, during the year 1871.

HEDWIGIA. Nos. 1 to 4, for 1872, contain descriptions of new species of Desmids, found in the United States by Dr. Wood, transcribed from the "Proceedings of the Academy of Natural Sciences, of Philadelphia," No. 3, Aug., Sept., 1869. An abstract of "Polymorphic Fungi," by M. C. Cooke, in "Pop. Sci. Rev.," Jan. 1871. Conspectus of the Families of Cryptogamia, as arranged by Ferdinand Cohn. Review of M. C. Cooke's "Handbook of British Fungi," with other notices and reviews.

PODISOMA. A communication on the supposed Fungus on Coleus leaves, and notes on Podisoma, by Henry J. Slack, F.G.S., is published in the "Monthly Microscopical Journal," No. 41, for May, 1872.

MYCOLOGIA EUROPÆA, by Gonnermann and Rabenhorst. Parts 8 and 9 contain plates of the Agaricini.

TRANSACTIONS OF THE BOTANICAL SOCIETY OF EDINBURGH, vol. xi., part 1, contains papers "On new and rare Mosses, from Ben Lawers, Perthshire," by J. Stirton, M.D., in which *Zygodon Stirtoni* (Schp.), *Hypnum Breadalbanense* (White), and *Hypnum annotinum* (Stirt.), are included, but without any diagnosis. "Notes on the structure and measurement of cells of Hepaticæ," by J. W. Edmond, M.B., is a very useful, practical paper. "Notes on the distribution of Algæ," by George Dickie, M.D., Professor of Botany, Aberdeen.

JOURNAL OF THE LINNEAN SOCIETY, No. 66, contains "Bryological Notes," by S. O. Lindberg, M.D., with descriptions and synonymy of *Hypnum Teesdalei* (Sm.), *Hypnum curvisetum* (Brid.). The synonyms of *Clasmatodon parvulus* (Sull.), *Clasmatodon perpusillus* (Lindb.), and *Clasmatodon Bertrami* (Lindb.); and also descriptions of *Fabronia Schimperii* (De N.), and *Fabronia pusilla* (De N.).

CONTRIBUTION TO THE BIOLOGY AND HISTORY OF THE DEVELOPMENT OF THE USTILAGINEÆ, by Dr. Fischer von Waldheim, translated for the "Transactions of the New York State Agricultural Society," for 1870, and just published at Albany, N. Y. It is a translation of the memoir published in Pringsheim's "Jahrbucher," for 1869.

REPORT OF THE BOTANIST to the New York State Cabinet of Natural History, for the year 1869, Appendix C, contains figures and descriptions of several new species of U.S. Fungi. Albany, 1872.

A SYNOPSIS OF THE ERYSHIPHEI OF THE UNITED STATES, by M. C. Cooke, M.A., and C. H. Peck, is published in the "Journal of Botany," for January and June, 1872.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY,
AND ITS LITERATURE.

NEW-YORK FUNGI.

Described by CHARLES H. PECK.

The following are in continuation from page 4.

Agaricus (Pleurotus) serotinoïdes. *Peck.*—Pileus fleshy, thick, firm, convex above, minutely punctate-tomentose, slightly viscid when young or moist, the margin usually incurved; gills close, determinately ceasing, some of them forked, white or yellowish; stem lateral, short, thick, scarcely distinct when viewed from above, yellow and tomentose beneath.—*Report, p. 86.*

Trunks of deciduous trees in woods. Oct. Nov.

Cæspitose, imbricating, or solitary, 1-2 in. broad, grayish brown, variously modified with yellow and greenish or olivaceous hues; edge of the gills sometimes discoloured and slightly floccose.

Agaricus (Entoloma) strictior. *Peck.*—Pileus thin, submembranaceous, broadly convex or expanded, umbonate, smooth, shining, hygrophanous, striatulate, grayish-brown; gills rather broad, rounded or deeply emarginate at the stem, pale, flesh-coloured; stem straight, equal, or very slightly tapering upward, nearly smooth, hollow, with a dense white mycelium at the base.—*Report, p. 88, t. ii., f. 6-9.*

Ground in groves and their borders. Albany. Oct.

Height 2-4 in., breadth of pileus 1-2 in., stem 1-2 lines thick.

Agaricus (Clitopilus) noveboracensis. *Peck.*—Pileus fleshy, thin convex, then expanded or slightly depressed, with the margin recurved, dingy white, cracking into areas, or concentrically rivulose, sometimes obscurely zonate; gills close, narrow, long decurrent, some of them forked, white, at length dingy, tinged with yellow or flesh-colour; stem concolorous with the pileus, equal, solid, smooth, with white mycelium, and brittle branching white rootlets.—*Report, p. 89.*

In woods and pastures. North Elba and Albany. Aug. Oct. Gregarious or sub-cæspitose. Height 1-2 in.; breadth 1-2 in.; stem 1-2 lin. thick. Odour of new meal, taste very bitter, spores globose, pale flesh-coloured.

Agaricus (Pholiota) temnophyllus. *Peck.*—Pileus fleshy, hemispherical, then convex, smooth, dull yellow; gills very broad, attached, obliquely truncate at the inner extremity, brownish-ferruginous.

nous ; stem equal, smooth, white, hollow, annulate ; ring membranaceous, white, dusted with the brownish-ferruginous spores.—*Report, p. 90.*

Grassy ground by road sides. Sandlake. June.

Height 2-4 in. ; breadth $1\frac{1}{2}$ -2 in. ; stem 3-4 lines thick.

Agaricus (Flammula) Hallianus. *Peck.*—Pileus thin, hemispherical or convex, smooth, hygrophanous, watery cinnamon, with the margin obscurely striatulate when moist, dull yellow when dry ; gills close subarcuate, slightly decurrent, tapering to a narrow point at the outer extremity, and ceasing before the margin, cinnamon colour ; stem equal, slightly fibrillose, hollow, with a slight ring, reddish-brown.—*Report, p. 90.*

Pastures. Bethlehem. Nov.

Height 2-3 in. ; breadth 1-2 in. ; stem 2-3 lines thick. Taste a little bitter.

Agaricus (Naucoria) vernalis. *Peck.*—Pileus thin, fleshy, convex, then a little depressed, with a deflexed margin, umbonate, hygrophanous, dull yellow, darker when moist ; gills narrow, attached, cinnamon colour ; stem long, flexuous, striato-sulcate, hollow, tapering downwards, white-villous at the base, brownish.—*Report, p. 91.*

On rotten wood. Greenbush. May.

Height 2 in. ; breadth 8 lines 1 in. ; stem 1 line thick.

Agaricus (Naucoria) lignicola. *Peck.*—Pileus thin, convex, umbonate, smooth or slightly fibrillose, hygrophanous, watery cinnamon, and the margin striatulate when moist, dull yellow when dry ; gills narrow, close, attached, cinnamon colour ; stem slender, equal, hollow, slightly fibrillose, firm, mostly curved, reddish-brown.—*Report, p. 92.*

On old logs in woods. Sandlake. June.

Height 1-2 in. ; breadth $\frac{1}{2}$ -1 in.

Agaricus (Naucoria) fulvus. *Peck.*—Pileus thin, convex, then expanded, umbonate, tawny yellow, darker when moist ; gills broad, emarginate, decurrent toothed, cinnamon coloured ; stem equal, solid, subflexuous, a little paler than the pileus.—*Report, p. 92.*

Ground in pine woods. Bethlehem. Nov.

Height 1-1 $\frac{1}{2}$ in. ; breadth 4-8 lines.

Agaricus (Naucoria) autumnalis. *Peck.*—Pileus thin, fleshy, convex, smooth, hygrophanous, watery cinnamon, and marginally striatulate when moist, dull yellow when dry ; gills close, slightly emarginate, spuriously decurrent-toothed, easily separating from the stem, yellowish, then cinnamon colour ; stem slender, equal, hollow, fibrillose, paler than the pileus.—*Report, p. 92.*

On rotten wood in woods. North Greenbush. Nov.

Often caespitose, sometimes with a trace of a ring.

Agaricus (Naucoria) curvmarginatus. *Peck.*—Pileus, thin, convex, smooth, reddish-yellow, margin paler, reflexed, extending beyond the gills ; gills subventricose, emarginate, decurrent-toothed,

pale yellow or whitish, with a flesh-coloured tinge; stem equal, solid, wavy, with a whitish silky lustre.—*Report*, p. 22, t. ii. f. 1-5.

In mossy places in woods. North Elba. August.

Height 2-3 in.; breadth 4-6 lines.

Agaricus (Hebeloma) subochraceus. *Peck.*—Pileus thin, conical or convex, sometimes expanded, generally umbonate, fibrilloso-squamulose, pale ochraceous-yellow; gills rather broad, attached, emarginate, whitish, becoming brownish-yellow; stem equal, whitish, slightly fibrillose, solid.—*Report*, p. 96.

Ground in groves and open plains. Sandlake and West Albany. June—Oct.

Height 1-2 in. breadth 9-18 lines.

Agaricus (Hebeloma) sarcophyllus. *Peck.*—Pileus fleshy, short and obtusely conical or convex, smooth, white, margin incurved; gills broad, not crowded, attached, deeply emarginate, dingy flesh-colour; stem equal, smooth, white, firm, stuffed, mealy-squamulose above; spores smooth, very dark, ferruginous.—*Report*, p. 96, t. i. f. 7-11.

Wet grass of ground. Greenbush. June.

Height, 1-2 in.; breadth, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. Taste slightly bitter.

Agaricus (Psalliota) Johnsonianus. *Peck.*—Pileus fleshy, soft, brittle, broadly convex or expanded, smooth, white; disc yellowish; margin thin, sometimes purplish stained, when moist striatulate; gills close, rounded behind, nearly free, white, then brown; stem equal, smooth, annulate, solid, slightly striate at the top; ring white, tumid, stained with the brown spores.—*Report*, p. 98, t. iii. f. 4-6.

Grassy ground, in pastures. Knowersville. Sept.

Height, 2-4 in.; breadth, 2-4 in.; stem, 3-5 lines thick. Has a sweetish, nutty flavor.

Agaricus (Hypholoma) perplexus. *Peck.*—Pileus fleshy, convex, then expanded, often broadly sub-umbonate, smooth, yellow, the disc red or brownish-red, margin paler; gills not broad, rounded behind, easily separating from the stem, pale yellow, then greenish-tinged, finally purple-brown; stem subequal, firm, slightly fibrillose, hollow, yellow-reddish at the base; flesh white; spores purplish-brown.—*Report*, p. 99.

About stumps in woods or open places. Sandlake, Albany, and Catskill Mts. Sept.—Oct.

Height, 2-3 in.; breadth, 2-3 in.; stem, 2-3 lines thick. Taste mild.

Agaricus (Panæolus) solidipes. *Peck.*—Pileus firm, at first hemispherical, then sub-campanulate or convex, smooth, whitish, the cuticle at length breaking up into dingy-yellowish, rather large, angular scales; gills broad, slightly attached, whitish, becoming black; stem firm, smooth, white, solid, slightly striate at the top; spores very black, with a bluish tint.—*Report*, p. 101, t. iv. f. 1-5.

On dung heaps. West Albany. June.

BRITISH FUNGI.

By M. C. COOKE.

*Hyphomycetes.***Volutella roseolum.** *Cooke.* "Rosy Volutella."

Stem distinct, whole plant rose-pink; stroma subglobose, crowned above with obtuse cylindrical spores, surrounded by long flexuous, septate, attenuated, hyaline setæ.

On *Bilbergia*. Glasnevin. (*W. S. Keit.*)

Evidently allied to *Chaetostroma stipitatum*, Corda.

Volutella stipitatum. *B. & Br.* "Stipitate Volutella."

Stem short, brownish, or none; stroma spherical, fleshy, covered above with a stratum of rosy spores, and furnished with solitary, rigid, septate, subulate, hyaline setæ; spores ovate-oblong, minute, hyaline.—*Chaetostroma stipitatum*, Corda *Ic. iii. f. 83. B. & Br. Ann. N.H. no. 1312. Psilonia stipitata, Lib. exs. 287.*

On elder. Batheaston, March, 1869.

"This belongs properly to the genus *Volutella*."—*B. & Br.*

Epicoccum micropus. *Corda.* "Small-stemmed Epicoccum."

Gregarious; tufts effused, black; stroma subglobose, then depressed, reddish-brown; casidia emergent, clavate, transversely septate, brown; spores subglobose or tetrahedral, base depressed, apodal or very shortly pedicellate, smooth, brown.—*Corda Ic. iii. f. 82. B. & Br. Ann. N.H. no. 1313.*

On decaying *Lactarius deliciosus*. Ascot. Oct.

Spondylocadium. *Preuss.*

Hyphasma creeping, septate; fertile flocci erect, simple or somewhat branched, septate; spores homogeneous, cellular, laterally opposite or verticillate.—*Preuss in Sturm. D.F. vi. p. 105.*

Spondylocadium fumosum. *Preuss.* "Smoky Spondylocadium."

Tufts effused, black; hyphasma branched, septate; flocci simple, septate, erect, pellucid, brown, bearing three or four spores in a verticillate manner from the upper septa, spores subfusiform, brown, with the endochrome twice divided.—*Preuss in Sturm. D.F. no. 35, t. 53. B. & Br. Ann. N.H. no. 1314, t. 18, f. 7.*

On rotten sticks. Batheaston, March. Spores .001 in. long, .0004-.0005 in. wide.

Graphium stilboideum. *Corda.* "Cabbage stalk Graphium."

Gregarious; stem erect, subulate, simple, black, opaque; head of spores glutinous, whitish, then livid; threads simple, whitish; spores ovate, oblong, pellucid.—*Corda Ic. ii., f. 69. B. & Br. Ann. N.H. no. 1315.*

On cabbage stalks. Batheaston. April, 1869. Spores .0002-.0004 in. long.

Peronospora entospora. *B. & Br.* "Clavate Peronospora."

Fertile threads simple, clavate, surmounted by a crown of apiculi, bearing the ellipsoidal conidea, each of which papillate at the apex; endochrome granular. Oogonia yellowish, subglobose, tuberculate.

B. & Br. Ann. N.H. no. 1317, t. 18, f. 8. Basidiophora entospora
Roze & Cornu, Ann. Sc. Nat. Ser. v., vol. xi, t. 4.

On *Erigeron canadense*. Wimbeldon. June. Resting spores echinulate .001 in. diam. (*M.J.B.*)

Peronospora Lamii. *Braun.* "Dead nettle Peronospora."

Fertile threads short, 5-7 times dichotomous, branches attenuated, patent, all more or less arcuate, ultimate ramuli often elongated and acutely subulate. Conidia pedicellate, globose or ovoid, quite obtuse, membrane pale violaceous. Oospores slightly brown.—*Rabh. Myc. ii., no. 325. De Bary Ann. Sc. Nat., 1863, xx., p. 120.*

On *Lamium purpureum*, &c. Welshpool (*Rev. J. E. Vize*).

Peronospora Ficariæ. *Tul.* "Buttercup Peronospora."

Fertile threads small, usually 5-6 times equally or unequally dichotomous, ultimate and penultimate branches arcuate, reflexed or inflexed ultimate often subulate. Conidia broadly ellipsoid and obtuse, membrane pale violaceous. Epispore of Oospores pale yellowish brown.—*Tul. Compt. Rend. Jan. 26, 1854. De Bary, Ann. Sc. Nat., 1863, xx., p. 117. Fckl. exs. no. 3. P. grisea Rabh. Herb. My. no. 322.*

On *Ranunculus repens*. Welshpool (*Rev. J. E. Vize*).

Oidium aurantium. *Cooke.* "Orange Oidium."

Forming dense, irregular, effused, bright orange tufts, sometimes several inches in length. Hyphasma creeping, branched, robust, septate, surmounted by simple or branched moniliform threads, which break up into subglobose or elliptical spores; endochrome granular.—*Cooke exs. no. 448.*

On spent hops. Burton-on-Trent. Aug. 1871. (*Edwin Brown, Esq.*)

Endodesmia. *B. & Br.*

Forming little tufts; flocci shining, glaucous, smooth, without septa, slightly curved; spores concatenate, uniseptate, elliptical, appendiculate at each extremity.—*B. & Br. Ann. N.H. no. 1318 (1871).*

Endodesmia glauca. *B. & Br.* "Glaucous Endodesmia."

Spores .0004-.0005 in. long, .0002 in. wide.—*B. & Br. Ann. N.H. no. 1318, t. xx. f. 9.*

On cabbage stalks. Batheaston. April.

Acremonium ranigenum. *B. & Br.* "Frog Acremonium."

Stem composed of the aggregated flocci; tips elongated, free; spores agglomerated, globose, echinulate, shortly pedicellate.—*B. & Br. Ann. N.H. no. 1319, t. xviii. f. 10.*

On dead frogs. Monkton Farleigh. Sept.

Stem composed of a multitude of septate threads, of a delicate lemon-yellow, which diverge upwards and form a subglobose head; the threads give origin on all sides to globose spores crowded so as to form little masses. Spores .0004 in. diameter.

RECENT OBSERVATIONS ON COLLEMA, &c., BRIEFLY CONSIDERED.

By WILLIAM ARCHER.

As promised in the preceding number of this journal, I purpose setting forth, as briefly as possible, the views of Schwendener and Reess (page 11) on *Collema*, &c. Relinquishing the opinions supported by him in the earlier portions of his elaborate memoir on the Lichen-thallus,* Schwendener, before he concludes, propounds the doctrine that not only are the "Lichens" in question (the Collemaeae, alluded to by de Bary) no "Lichens," but that the whole class, without exception, fall under the same category; that is to say, that each is to be regarded as some one or other Algal-type which has become, as it were, the home or residence of a parasitic growth—the combination of the two being, in point of fact, the so-called Lichen. His views on the question the author has given more at large, in relation to various types, in a subsequent memoir.† These he states generally thus:—"As the result of my researches all these growths [Lichens] are not simple plants, not individuals in the ordinary sense of the word; they are rather colonies, which consist of hundreds and thousands of individuals, of which, however, one alone plays the master, whilst the rest, in perpetual captivity, prepare the nutriment for themselves and their master. This master is a fungus of the class of Ascomycetes, a parasite which is accustomed to live upon others' work; its slaves are green algæ, which it has sought out, or indeed caught hold of, and compelled into its service. It surrounds them, as a spider its prey, with a fibrous net of narrow meshes, which is gradually converted into an impenetrable covering; but, whilst the spider sucks its prey and leaves it lying dead, the fungus incites the algæ found in its net to more rapid activity—nay, to more vigorous increase. . . . If this mode of illustration be permissible, this fungus forms a remarkable contrast not only to the predatory and murderous spider, but, in quite an analogous way, to the vine and potato-fungus, as well as all other fungi which vegetate in living organisms, and destroy their host-plant, or host-animal, in the unequal struggle."‡ Such, "popularly" expressed, is Schwendener's view as to "Lichens" at large, which he now holds and supports. This quotation, I would venture to suggest, would seem sufficiently to convey its own refutation of the hypothesis, inasmuch as this assumed *parasitic fungus* does *not destroy* or live upon its assumed *algal-host*. If the "parasite" cannot be a "fungus" it must be something else—that *something else* no more nor less than the veritable "lichen," though it may be, indeed, but in part represented; though, of

* Dr. S. Schwendener—"Untersuchungen ueber den Flechten-thallus," in Prof. Nägeli's "Beiträge zur wissensch. Botanik," Hft. 4, p. 195 (1868).

† Dr. S. Schwendener—"Die Algentypen der Flechtengonidien," Basel, 1869.

‡ Schwendener—"Die Algentypen," etc., p. 3.

course, on all hands it is agreed that Lichens and Fungi, save the gonidia, have between them no absolute line of demarcation.

Seemingly at first more impressed with the applicability of the theory to the Collemaceæ, though he no doubt afterwards accepts its complete tenability as regards the whole class of the "Lichens," Reess conceived the idea of "sowing" the spores of Collema upon the substance of Nostoc, and a description of the experiment and its results forms the subject of his memoir previously alluded to.* He states, indeed, that the spores of Collema can be readily enough made to germinate upon any moist substratum, such as a glass-plate, stones, and so on, and will slowly produce even a branched and sparingly jointed growth, but this goes on only so long as the reserve-stuff is supplied by the spore, but when this is exhausted the hyphamass thus produced, though it may survive even weeks, will then slowly die off. But when he brings a spore or the young hypha upon the Nostoc, it at once becomes further developed, sending more or less copiously through its surface many branches, and penetrating within. Soon, however, they cease to increase in length, become swollen at the points and at other places, and become attached by these swellings upon the Nostoc. Thereupon thinner processes become sent further into the gelatinous mass of the Nostoc, from the swellings; these become branched, and, tortuously surrounding the chains of gonidia, form, in fact, the "Collema-mycelium," and the complete transformation or conversion of the "Nostoc" into the Collema is brought about by the hypha producing a peripheral stratum of fibres, from which break forth, through the "Nostoc-jelly," the first root hairs. Such an *artificially* produced "Collema" the author had not been able to rear up as far as the production of fructification (apothecia), but he doubts not the tenability of the assumption that every Collema in free nature is a "*Nostoc*," thus made the nidus for the development of the spores, evolved of course from a preceding "Nostoc" so naturally inoculated (as one might say), *i.e.*, in other words, a preceding compound organisation which is known as "Collema." Such is, as brief as possible, the result of Reess's experiences, and the views he holds; it would far exceed the limits available in these pages to go more closely into the arguments and statements of Reess and Schwendener—those of the latter applied to the Lichens at large, not the Collemaceæ only—but it may not be wholly without use to have directed attention to their remarkable memoirs.

Basing his opinion, as it would seem, at least mainly, upon the result of the experiments of Professor Reess alluded to, Professor Cohn† would exclude the Collemaceæ from the Lichens, which (without these), as a Class, he would retain, remarking that "he

* Prof. Reess—"Ueber die Entstehung der Flechte *Collema glaucescens*, Hoffm. durch Aussaat der Sporen derselben auf *Nostoc lichenoides*, Vauch." in "Monatsb. der k. Akad. der Wissensch. zu Berlin," Oct. 1871, p. 523.

† Prof. Dr. F. Cohn—"Conspetus Familiarum cryptogamarum secundum methodum naturalem dispositarum," in "Hedwigia," No. 2, 1872, p. 17.

knows no Algæ which could be transformed by the influence of a fungus into *Usnea*, *Cladonia*, *Cetraria*, etc., but that it appears to him that the parasitism has been rendered by de Bary and Reess extremely probable for the 'Collemaceæ.'"

Schwendener himself, in his later memoir,* figures certain *Nostoc* specimens whose gelatinous matrix is seen to be penetrated by what he denominates fungal threads (*Pilsfaser*), and these he points to as evidence of the truth of his view; that is, that they become the hypha, and that the phenomena of growth thereby induced absolutely convert the "*Nostoc*" into "*Collema*;" and he firmly holds his figures *prove* the case. Now, Reess, referring to these very figures, conceives the fungal threads depicted must be strictly those of a (destructive) fungus—a mould, in point of fact; he thinks, indeed, they may be anything whatever, but one thing clearly he avers, be they what they may, they are by no means a *Collema*-hypha, founding his opinion, of course, upon the knowledge gained from his recently conducted experiments. So that whatever may be the opinion of other observers as to the result of the researches of Reess, at least the examples adduced by Schwendener relating to *Collema*, it would appear, must be held as inconclusive.

It may, perhaps, be not inopportune to observe that, as must be well known, the gelatinous masses of those Algæ which grow on wet rocks and such situations, be they *Palmellaceæ* or *Chroococcaceæ*, are prone to be more or less permeated by "mycelioid" threads, and even some such as would fairly well accord with those Reess depicts for *Collema*, though not so copiously branched, may not be unusual. Some of these threads are, at least occasionally, those of indubitable (devastating) fungi, which, when they "attack" certain cells, destroy them; other threads, doubtless quite distinct, can apparently live independently and innocuously, though probably drawing nutriment from the common mucous matrix. What a monstrous and abnormal "Lichen-thallus" thus not unfrequently comes to view—a variable "hypha" interruptedly running hither and thither, and accompanied by "gonidia" of very heterogeneous character! The plant named by Kützinger, *Trichodictyon rupestre*, which can hardly be doubted to be the same as *Cylindrocystis crassa*, de Bary, is frequently (though not always) accompanied by a number of fine filaments (which seem, however, to be inarticulate), twisted in and out through the gelatinous mass made by the alga, but so running as to leave rounded spaces between containing the groups of the *Cylindrocystis*-cells; they seem, in fact, to urge their way between the more dense mucous envelopes formed round the groups of dividing cells, simply because they find the intervals, being softer, more readily permeable. These filaments, whatever their nature really may be, cannot be doubted I should think to be foreign, though they were actually introduced into the generic

* "Die Algentypen," etc., pp. 28, 29, t. II., ff. 13-15.

characters by Kützing, being considered by him as somehow a portion of the structure of the alga, which, indeed, itself reproduces by conjugation, and is, no doubt, in fact, a desmid.

Schwendener claims as the foundation or basis for the production of "Collemaceæ" only such nostochaceous plants as live in moist or wet habitats—the entirely aquatic forms (*Trichormus*, *Sphærozyga*, *Cylindrospermum*, *Dolichospermum*), he considers, being inaccessible under water, are protected from the attack of the parasite, and thus "cannot enter into the 'gonidia question.'" The fact that these latter form independent "spore-cells" (reproducing the plant), he would seem, so far as we can judge, to hold as having no material, if any, bearing on the question, for he dwells only on their being submerged as giving them an immunity. "But in any case," he says, afterwards, further on, as regards the question, "whether certain species of *Cylindrospermum* pass into the 'gonidia state' [that is, become the basis of Collemaceæ] remains for so long doubtful, till the transition, here alone decisive, be observed. In the *Collema*-thallus itself a decision is of course no longer possible, since the spores characteristic of *Cylindrospermum* apparently just as little come to development in the gonidial state, as do the 'manubria' of the *Rivulariæ*." (This last allusion has a bearing on *Lichina*, &c., which the author thinks have plants appertaining to *Rivulariæ* for their basis, but without *manubria*.) I would venture to suggest were such Algæ as these truly seized upon by this completely innocuous parasite—nay, which, if the hypothesis be true, rather tends to favour the growth and vigour of the "gonidia"—we should hardly expect that, on the other hand, the innate or inherited tendency to produce "spores" would at the same time become wholly extinguished. It would, I should venture to suppose, seem probable, even admitting the views of Schwendener and Reess as regards *Nostoc*, that *Cylindrospermum* is not likely to have anything to say to the "gonidia question." But the isolated observation, for the first time recorded in the preceding brief communication,* would seem to show that *Nostoc*, too, may form spores, though it be, indeed, so very exceptionally, and so extremely rarely.

The main object, then, of the present communication is to offer the following three suggestions which occur to me:—

1. To suggest the possibility that, if we may conceive *Dolichospermum*, &c., excluded from the "gonidia question" as forming special fruit (that is, "spores"), so might we regard *Nostoc* as excluded, though its formation of spores be so extremely rare. Seemingly, indeed, the formation of spores by an algal species, supposed to become occasionally *lichenized*, is not a reason *against* the hypothesis as viewed by Schwendener—he only assumes that such an example of the alga surrenders, or leaves in abeyance, its tendency to the production of spores.

* "*Grevillea*," No. 1. July, 1872, p. 10.

2. To suggest that there are veritable lichens which live submerged, and produce their apothecia. I presume, however, it might be replied that such may have received their inoculation by the parasite during some season of drought, when the *alga* lay "high and dry."

3. To suggest the possibility that the spores of *Collema*, if "sown" on some other gelatinous substratum, besides that of *Nostoc*—say, for instance, a *Palmella* or *Mesotænium*—might equally well germinate, penetrate therein, and develop a hypha. There seems, I venture to think, no *à priori* reason against this supposition—inside the *Nostoc*, the "reserve-stuff" of the spore being exhausted, and the chains of *Nostoc* filaments admittedly intact, the only next immediate source of nutriment for the growing hypha would, I imagine, in the experiment of Reess, appear to have been the "*Nostoc-jelly*."

Now a "*Palmella-jelly*," or a "*Mesotænium-jelly*" (both aerial, that is, not under water), would seem in themselves to be possibly just as likely to afford the requisite *pabulum* for the germinating and growing *Collema*-spore. If this conjecture should be borne out, which I would indeed put with all diffidence, what would be the result of Reess's experiments, or, rather, what proven thereby? Such a combination (*if* capable) with a *Palmella* or a *Mesotænium* would not be "*Collema*," because it would not have "*nostochaecous*" gonidia, nor the characteristic periderm. If, indeed, we might for a moment assume that which direct experiment alone could prove, and a germination of spores and penetration of the hypha of a *Collema* with a *Mesotænium* effected, such a "*lichen-thallus*" would be, I apprehend, unprecedented—a hypha *like* other lichen-hyphæ, no doubt (but *known* to be that of a *Collema*), with large elliptical or cylindrical "gonidia" containing a central "chlorophyll-plate," and which would probably (in free nature at least) go on and produce *zygospores*!

I trust that the readers of these and my foregoing remarks will understand that I put them forward but with great diffidence; it was the occurrence of my little spore-bearing *Nostoc*, which suggested to me to venture to do so. Isolated, indeed, as was that example, still no matter from what aspect viewed, even though it be urged that we should look upon it as "abnormal" on account of its rarity, it cannot, I apprehend, but be regarded under any circumstances as to a certain extent suggestive and as possessing a considerable amount of significance.

Clavaria rosea. *Fr.*—At the Liverpool Naturalists' Field Club Excursion to Saddleworth, June 29th, this rare *Clavaria* was collected.
H. H. HIGGINS.

North American Fungi.—A series of papers on this subject, by the Rev. M. J. Berkeley, M.A., will be commenced in the next number of this Journal.

A NEW MOSS FROM IRELAND.

By DR. ROBT. BRAITHWAITE, F.L.S.

Splachnobryum. C. Müller, Verhandl. Zool. Bot. Ges. Wien., 1869, p. 501.

Calyptra dimidiate, enclosing the whole theca, and embracing spirally the upper part of the seta, cleft at the side, smooth, fugacious. Peristome simple, arising below the orifice of capsule; teeth 16, very narrow, linear-lanceolate, acicular, with the articulations remote. Columella immersed. Dioicous, male flower terminal, gemmaceous, without paraphyses. Plants small, slender, with distant spatulate leaves. Natives of equatorial America and India.

S. Wrightii: C. Müll., l. c. *Entosthodon minimus*: Hunt, Proc. Lit. and Phil. Soc. of Manch., xi., p. 19 (1871). *Amblyphyllum Hibernicum*, Lindberg, M.S.

Dioicous, minute, gregarious. Stems $\frac{1}{3}$ to $\frac{1}{4}$ in. high, simple subflexuose, pale red, with a few slightly branched radicles. Leaves bright green distant, with a narrow and slightly decurrent base, patent, flattish, obovate or spatulate, rounded at apex, the margin somewhat reflexed in the lower half, entire or minutely serrulate in the male plant, crenulate in the upper part in the female; nerve thick, prominent at back, vanishing below apex, less clearly defined in the male plant; cells lax, large, pellucid, smooth, incrassate, rhombo-rectangular at base, rhomboidal above, smaller and nearly circular at margin, especially in the male. Male flower terminal, bracts erect, resembling the leaves, antheridia 3 to 8. Seta slender, twisted to the left, pale brownish-yellow; capsule erect, obconical at base, subcylindric, wide-mouthed, pale brown; operculum conical, acute; teeth of peristome very slender, pale red, erect. Calyptra long, conical, very narrow, its cells arranged spirally, spores smooth. Fr. August.

Hab. Top of the wall of a forcing-pit in the Botanic Gardens, Glasnevin, Dublin. (Mr. D. Orr.)

We fear this interesting little moss can hardly be regarded as indigenous, for the spores have most probably been mixed with soil attached to some exotic, and thus accidentally scattered on the sandstone wall, where it was found. So much do the leaves resemble those of Splachnaceæ in areolation, that at first I was inclined to follow C. Müller and Hampe in referring it to that family; but on the other hand the equally high authorities Mitten and Lindberg place it in Trichostomaceæ, and after careful consideration I am satisfied that in the structure of the peristome, the calyptra like that of Tortula, and the place of growth it entirely accords with that family.

The type of the genus is *S. obtusum*, C. Müll. Bridel (*Weissia obtusa*, Sp. Musc., i., p. 118, 1806; *Didymodon? splachnifolius*, Hook. Musc. Exot., t. 126, 1820; *Dissodon rotundifolius*, C. Müll, Syn., i., p. 140, 1849), from the Antilles, to which the present species was referred by Sullivant in the "Musci Cubenses Wrightiani"

(Proc. Amer. Ac. of Arts and Sc., 1861); but it is separated by C. Müller in the paper quoted, and with the Cuba plant the Irish specimens, kindly sent by Dr. Moore, agree in everything but size, and though Müller describes the leaf as "marginè integerrimo" in both, it is distinctly crenulate.

The other species of the genus are—

3. *S. flaccidum* (*Weissia flaccida*, Harvey, Hook. Ic. Pl., t. 18, f. 3), from Nepal.

4. *S. Wulfschlägelii*, C. M., from Surinam.

5. *S. Bernoullii*, C. M., from Guatemala.

6. *S. Indicum*, Hampe and C. M., from Calcutta.

7. *S. Spruceanum*, C. M. (*Weissia* § *Tapeinodon splachnifolia*, Mitten, Musci. Austr. Amer.), from the Andes.

Another species is also referred to with papillose leaves, from Tranquebar.—*Journal of Botany*, for July, 1872, p. 193.

OBSERVATIONS ON THE ABOVE MOSS. By PROF. LINDBERG.

The characters of the plant before us show that it cannot be an *Entosthodon* (i.e., *Funaria*), but that it must belong to a different tribe of mosses, and if we pass before us all the European species, we do not find one allied to it, and must therefore extend our view to exotic forms. In the tropical parts of America and Asia grow a few minute tufted mosses, which have lately been considered to form a proper genus (*Tapeinodon* or *Splachnobryum*), the type of which is the old *Didymodon* (?) *splachnifolius*, Hooker.

The specimens named *Tapeinodon splachnifolius*, from Tarapoto (No. 209, b. coll., R. Spruce), seem to be a proper robust form or species distinguished by its size and larger flaccid leaves.

Another species is *Weissia flaccida*, Harvey, very distinct by its erect narrow leaves, reflexed at apex, which is obtuse as in all other forms of the genus.

As to its systematic position, it has not a natural place among *Splachnaceæ*, or *Funariaceæ*, for the following characters militate against it:—The habitat on rocks or naked barren soil; the habit resembling that of certain *Trichostomeæ*, thus the plant from Tarapoto is very like some states of *Tr. tophaceum*; the usually dull green or light dirty brown colour of the leaves, which are small and nearly all of one size, easily softened in water, and with cells for the most part distinctly incrassated, and the uppermost much smaller than the rest; the dioicous inflorescence (no dioicous form has yet been found among *Funariaceæ*); the open indistinct andrœcium, which wants all trace of paraphyses; the very narrow pungent teeth of the peristome, with numerous trabeculæ on the inside and papillose on both surfaces, and, indeed, not much unlike that of *Eucladium verticillatum*; and, lastly, the very narrow calyptra, and seta twisted just as in *Trich. rubellum*. Judging from all these characters, of great importance in a natural arrangement, I must place the genus in *Trichostomeæ*, where we find some forms, e.g., *Pottia vernicosa* (Bryol. Javan. t. 51), having leaves of nearly the same structure.

The oldest denomination of the genus is rather difficult to determine. The species have been called by different authors *Didymodon*, *Dissodon*, *Pottia*, *Syrhropodon*, and *Weissia*; but only Dr. C. Müller and Mr. Mitten have given them proper generic denominations. The former called the genus at first *Amblyphyllum* among the synonyms under his *Dissodon rotundifolius* (Synop. Musc. I., p. 140), but without any diagnosis; later (in Verh. Z. B., Ges. Wien, 1869, p. 503) *Splachnobryum*. Mr. Mitten also has named it, but without any generic description, *Tapeinodon*, in Spruce, Cat. Musc. Amaz. And., p. 4 (1867), and in his Musc. Austr. Amer., p. 141 (1869), *Weissia*, Sect. 8, *Tapeinodon*. Which name must we adopt according to the law of priority? I think *Amblyphyllum*; but we must not forget that in Müller's Syn. Musc. I., p. 286, we again find the same name applied to a section of *Bryum*.* But this section, formed of *B. calophyllum* and *cyclophyllum*, is very unnatural, and can never be considered as a genus, distinct from the other species of the vast genus *Bryum*. I cannot, therefore, see any objection to using the denomination *Amblyphyllum* for this very natural and interesting genus of *Trichostomeæ*.

A GRIMMIA NEW TO BRITAIN.

Mr. Bagnall, of Birmingham, detected, in June last, a species of *Grimmia* he could not determine, which I at once recognised as *G. crinita*, Brid., a species closely allied to *G. anodon*, and occurring in Southern Europe, on the plaster of walls. He found it occupying a precisely similar locality on the wall of a bridge over the canal a few miles from Warwick, and its characters are as follows:—

Grimmia crinita, Bridel, Sp. Musc., part 1, p. 95 (1806).

Monoicous, in low diffuse flat tufts, silky on the surface, with long white hairs, which form a pencil-like tip to the branches. Stem simple, or but slightly divided. Leaves imbricated, erecto-appressed, lowest lanceolate, muticous, upper obovate, oblong channelled, with a broadly diaphanous apex continued into a hair as long as the lamina, which in the perichaetial leaves extends far above the capsule; nerve vanishing below apex; margin erect or plane; cells at base elongated, diaphanous, above finely chlorophyllose; oblong or rounded, large, incrassate. Capsule on a weak sigmoid pedicel, subcernuous, subventricose ovate, lightly striate, brown, furrowed when dry; operculum convex, with an obtuse conical point; annulus broad, compound; calyptra dimidiate, bilobed; teeth of peristome red, erect, bi-trifid to the middle.

R. B.

* As the system of vegetation in mosses must be regarded as of much greater importance than that of fructification, in the natural limitations of the higher divisions, I am convinced that *Leptobryum pyriforme* holds a very artificial place among the true *Bryeæ*; and I propose to transfer it to *Ditrichaceæ* (*Leptotrichaceæ*), on account of its habit and mode of growth, the form and structure of the leaves and bracts, the synoicous inflorescence, and the glossy leptodermous theca. The habit and leaf structure are nearly the same as in *D. pallidum*, and this very natural genus thus holds in *Ditrichaceæ* a place analogous to *Lamprophyllum* (*Webera*), among *Bryeæ*, and, indeed, there exists between these two genera (*Leptobryum* and *Lamprophyllum*), analogy, but no affinity at all.

NOVARA DIATOMS.

Descriptions of New Genera and Species of Diatoms obtained by the Austrian Imperial Frigate Novara, during her Voyage round the World.

By HERR A. GRUNOW.

(Translated by F. KITTON.)

PART I. (with Plate ii.)

We have much pleasure in introducing to our readers an English translation, and *fac similes* of the new forms obtained during the above expedition. As copies of the original paper are difficult to obtain, we have no doubt that this and the succeeding paper will be welcomed by those who are studying the Diatomaceæ.

Gomphonitzschia Ungeriana, *Grun.*—Frustules small, linear cuneate, valve linear lanceolate cuneate, apex rounded.

Puncta 33 in. .001, striæ transverse, delicate, about 60 in. .001.

Sometimes sessile on a mucous cushion, at others attached to a short stipes.

[Pl. ii, f. 1, valve *a*, *b* side view of frustule, *c* front view do., *d* stipitate variety, *e* sessile do.]

Upon *Cladophora macrogonia*, Upper Egypt, Unger.

A well marked species, nearly approaching the *Nitzschia*, but also bearing a resemblance to *Gomphonema*, *Meridion*, *Lichmophora*, *Roikosphenia*, &c.

Synedra investiens, *W. Smith, Synopsis Brit. Diat.*—[Pl. ii, f. 2, *a* valve, *b d c* front view of a double frustule.]

In a mass upon *Ectocarpus littoralis*, from the shores of the Island of St. Paul, in the South Sea.

Its appearance on *Ectocarpus*, as well as the strong striæ leaves no doubt about the determination of this unfigured species of *Smith*. I have given two side views, and a front view of a double frustule.

(The fact of its growth on an *Ectocarpus* is of no specific importance; I have found it investing *Polysiphonia pulvinata*? and also parasitic on the stipes of a *Rhipidophora*, *F. K.*)

Diatoma? exiguum, *Grun.*, n. s.—Frustules minute, linear, valves linear with rounded apices; costæ strong 18-20 in. .001. [Pl. ii, f. 3, *a b c d* front view, *e* side view.]

Upon *Lessonia*, from the coast of Chili.

It may possibly be a small *Denticula*; it also resembles a *Diatoma* or *Odontidium*, between which the generic differences are very uncertain. (I should be inclined to refer it to *Diatoma elongatum*, var. γ , *Sm. Brit. Diat.* = *D. tenue*, *Kutz. Bacill. Pl. xvii.*, 9, 10. *F. K.*)

Berkeleya Harveyana, *Grunow.*—[Pl. ii, f. 4.] He says it is distinguished from other species of *Berkeleya* by the club-shaped form of the mucous envelope (*Schleimmassen*). The frustules are small

linear, with rounded ends, and extremely fine striæ, fig. 4, *a*. (The author does not distinctly allude to fig. 4, which but for the absence of a central nodule might be referred to *Navicula Lewisiana*, of Greville.)

Campyloneis Grevillei = *Cocconeis Grevillei*, Smith, Brit. Diat., pl. 3, f. 35 = *C. parmula*, Bail, in Proceed. Phil. Acad., 1853. ? Upper valve cellules small, confluent and elongated, as they approach the narrow depressed medium space.

Var. obliqua minute, median space depressed, broad, subrhomboid, cellules minute, sometimes oblique; confluent, elongated on the margin, minute, irregular, lower valves with large radiant costæ, reaching to the narrow median blank space, which is sometimes oblique.

[Pl. iii, f. 5, *a* lower valve, *b* upper do.]

On *Ballia callitricha*, New Zealand, and other parts of the Southern Ocean.

Cocconeis pseudomarginata, Gregory.—*Var. intermedia* small, finely striate, upper valve pale, yellow, median line generally sigmoid. = *C. Kirichenpaueriana*, Rab. & Jan. [Pl. ii, f. 6, *a* upper valve, *b* lower.]

Common on Algæ in the warmer seas, Cape of Good Hope, Nicobar Isles, Manila, Tahiti.

C. pellucida var. *β. minor*, Grun. = *C. exarata*, Grun., in litt. —Broad, median line straight or slightly sigmoid, furrows (longitudinal), conspicuous, 3-5 on either side of the median space = *C. lineata*, Ehr. Micro. Geol., vi., 1, 40 ?? [Pl. ii, f. 7, *a* upper valve, *b* lower do.] On *Sarcomenia intermedia*, St. Paul, in the South Sea, on Algæ from the Cape of Good Hope, &c.

C. pellucida var. ? *γ* **sigmoidea**.—Median line sigmoid, central nodule sometimes transversely dilated, longitudinal furrows sometimes subsigmoid or equally arcuate, abbreviated towards the margin. [Pl. ii, f. 8, upper valve.] On Algæ, from Tahiti, common in the Red Sea.

Cocconeis ambigua, Grun., n. sp. ?—Upper valve ? marginal striæ interrupted by a smooth sub-marginal median line, following the contour of the valve; marginal striæ distinct, sub-radiant, 40 in. .001, interior part of the valve longitudinally and transversely striate; longitudinal striæ conspicuous; terminal and central nodules more or less distinct. [Pl. 2, f. 9, upper valve ? growing on *Ptilota asplenioides* on the coast of Kamtschatka.]

? *Var.* Transverse striæ obsolete; transverse striæ even on the marginal part of the valve, conspicuous. [Pl. 2, f. 22, upper valve with the preceding.]

(The large size of the valve and the peculiar striation renders it difficult to imagine that this form is the upper valve of the foregoing species. The so-called longitudinal striæ resemble the furrows on *C. pellucida*. [Fig. 7 *a*, and f. 8. F. K.]

Cocconeis pacifica, Grun., n. sp.—Lower valve with a distinct border of conspicuous granules, interior of valve hyaline and finely striate, median line straight, central nodule dilated into a transverse

fascia, upper valve, median line linear, or acutely lanceolate; costae strong, sub-radiant. [Pl. 10, *a* lower valve, *b c d* upper do. upon *Macrocyclus* from the coast of Chili.]

The upper valve has some resemblance to my *Raphoneis scutelloides*, which does not, however, appear to be a *Cocconeis*, as I have never been able to discover a lower valve. *Cocconeis Grantiana*, Greville, is perhaps the lower valve of a similar species, if not that of a small form of *C. scutellum*.

(I scarcely see how the upper valves differ from that of *Campyloneis Grevillei*, var. *obliqua*, f. 5 *a*, F. K.)

CONTENTS OF PLATE II.

Fig. 1. *Gomphonitzschia Ungerii*.—Fig. 2. *Synedra investiens*.—Fig. 3. *Diatoma* (?) *exiguum*.—Fig. 4. *Berkéleya Harveyi*.—Fig. 5. *Campyloneis Grevillei* var. *obliqua*.—Fig. 6. *Cocconeis pseudomarginata* var. *intermedia*.—Fig. 7. *Cocconeis pellucida* var. β minor. —Fig. 8. *Cocconeis pellucida* var. γ *sigmoidea*.—Fig. 9. *Cocconeis ambigua*.—Fig. 10. *Cocconeis pacifica*.—Fig. 11. *Orhoneis binotata* var. *Atlantica*.—Fig. 12. *Mastogloia marginulata*.—Fig. 13. *Pleurostauron Frauenfeldianum*.—Fig. 14. *Pleurostauron Javanicum*.—Fig. 15. *Stauroneis oblonga*.—Fig. 16. *Navicula javanica*.—Fig. 17. *Navicula pacifica*.—Fig. 18. *Pleurosigma australe*.—Fig. 19. *Diadesmis confervacea*.—Fig. 20. *Diadesmis peregrina*.—Fig. 21. *Craticula Perrotettii*.—Fig. 22. *Cocconeis ambigua* var. ?—Fig. 23. *Oscillaria Pöppigiana*.—Fig. 24. *Oscillaria Tahitensis*. All the figures, with the exception of 13 d. (which is $\times 500$) are $\times 400$ diameters.

CRYPTOGAMIC LITERATURE.

BULLETIN DE LA SOCIÉTÉ ROYALE DE BOTANIQUE DE BELGIQUE, tome x., No. 3, June, 1872, contains an excellent "Catalogue pour servir d'introduction à une monographie des Hépatiques de Belgique," by Alfred Cogniaux.

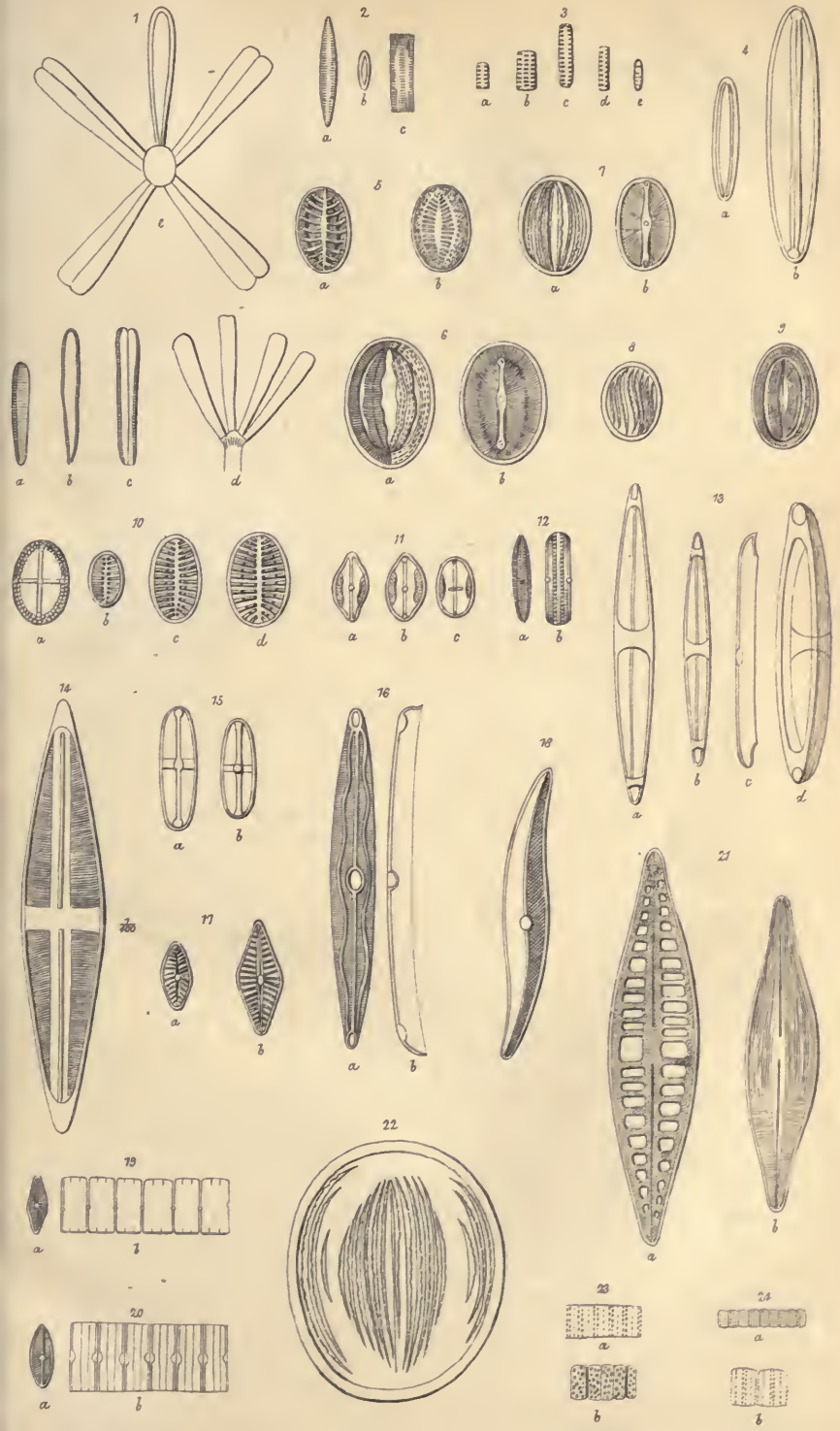
QUARTERLY JOURNAL OF MICROSCOPICAL SCIENCE, for July, 1872, includes a communication on "Some peculiar forms of *Navicula* from the Sulu Archipelago," by Rev. E. O'Meara, M.A. (with plate).

MONTHLY MICROSCOPICAL JOURNAL, for July, 1872, contains a continuation of Dr. R. Braithwaite's paper, on "Bog Mosses," with description and plate of *Sphagnum rubellum* (Wils).

JOURNAL OF BOTANY, for July, 1872, contains part v. of Dr. R. Braithwaite's "Recent Additions to our Moss Flora," and "Recent Researches on the Diatomaceæ," by Rev. E. O'Meara, M.A.

FLORA, for May, includes "Discussion on the Gonidia Question," by S. Schwendener; and "Bryological Notes from the Rhöngebirge," by A. Geheeb.

BULLETIN DE LA SOCIÉTÉ BOTANIQUE DE FRANCE, tome xviii., No. 2, includes papers on *Merulius lacrymans* and *Polyporus obducens*, by C. Roumeguère; on *Nitella syncarpa* and *Chara connivens*, by Mons. Chaboisseau; on the genus *Cordyceps*, by F. S. Cordier; and on the "Distribution of Mosses in the Vosges and the Jura," by Mons. Boulay.



Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY,
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By THE REV. M. J. BERKELEY, M.A., F.L.S.

It is proposed in this and future papers to continue what was already begun in the "Annals of Natural History" for December, 1853, and October, 1859. Of species already described only the more rare will be noticed, of all undescribed species the characters will be given. Specimens of many have been published without characters by Mr. H. W. Ravenel in his "Fungi Caroliniani." Some have already been described in my Decades of Fungi contained in Sir W. J. Hooker's "London Journal of Botany" and the "Kew Garden Miscellany," and of these the characters will be given, as the works may not be readily accessible. The numbers will be continued from the Paper of 1859. The cyphers following the descriptive characters are those of an enormous mass of Fungi, amounting to more than six thousand numbers, forwarded to me from time to time by the late Dr. Curtis.

101. **Lentinus omphalodes.** Berk. & Curt.—Pileo infundibuliformi, tenui; stipite gracili, sursum incrassato, basi fibrilloso spongiosoque; lamellis integris, angustis, decurrentibus. No. 3624. Pennsylvania, Dr. Michener.

Pileus $\frac{1}{2}$ in. across, infundibuliform, thin; stem $\frac{1}{2}$ – $\frac{3}{4}$ in. high, 1 line thick, slender, incrassated upwards, fibrillose and spongy at the base; gills entire, narrow, decurrent.

102. **Lentinus Micheneri.** B. & C.—Pileo umbilicato, ochraceo, glabro; margine lobato; stipite basi spongioso, umbrino; lamellis acie serrulatis. No. 3962. Penns. Dr. Michener.

Pileus $1\frac{1}{2}$ in. across, umbilicate, ochraceous, smooth, margin lobed; stem 1 in. high about $\frac{1}{4}$ in. thick, spongy at the base, umber; margin of the gills serrated.

103. **Lentinus hæmatopus.** B.—Pileo umbilicato depressove, ochraceo, glaberrimo; stipite brevissimo, cruento; lamellis decurrentibus, margine laceratis. N. America, locality unknown.

Pileus $1\frac{1}{4}$ – $1\frac{3}{4}$ in. across, umbilicate or depressed, ochraceous, quite smooth; stem 1–2 lines high, blood red, almost laccate at the base, $\frac{1}{4}$ in. thick; gills decurrent, margin lacerated.

104. **Lentinus pallidus.** B. & C.—Pileo convexo-plano, margine

fortiter inflexo; stipite sursum glabro, deorsum furfuraceo; lamellis decurrentibus, margine laciniatis. No. 2586. Car. Inf. Curtis.

Pileus $\frac{3}{4}$ in. across, convexo-plane; margin inflexed; stem $1\frac{1}{2}$ in. high $2\frac{1}{2}$ lines thick, smooth above, and furfuraceous below; gills decurrent, lacinate at the margin.

* **Lentinus lepideus.** Fr.—No. 1259, Car. Inf.

* **Lentinus tigrinus.** Fr.—No. 963. Santee River. No. 3148, Texas (C. Wright) is, I believe, a monstrous state of this species in which the gills form a reticulated spongy mass like the hymenium of *Secotium*. The same thing occurs in Ohio.

* **Lentinus Ravenelii.** B. & C. Kew Gard. Misc. i. p. 100.—Pileo tenui, umbilicato, subtiliter punctato-squamoso, lamellis tenuibus, dente-decurrentibus, margine laceratis. No. 1706, Santee River, Ravenel. No. 2716, Car. Inf. Curtis. No. 4632, Alabama, Beaumont.

Pileus $\frac{1}{2}$ -1 in. across, thin, umbilicate, delicately punctato-squamoso; stem $\frac{1}{2}$ - $1\frac{1}{2}$ in. high, 1 line thick; gills thin, decurrent with a tooth; margin lacerated.

* **Lentinus Lecomtei.** Fr.—No. 5152. Penns. Dr. Michener, on walnut.

* **Lentinus ursinus.** Fr.—No. 3983. Penns. Dr. Michener.

* **Lentinus pelliculosus.** Fr.—No. 2585. Car. Inf. Ohio, Lea.

* **Lentinus vulpinus.** Fr.—Ohio, Lea.

* **Xerotus nigrita.** Lév.—No. 2868. Car. Inf. Ravenel, on *Rhus radicans*, *R. toxicodendron*, & *Laurus Carolinæ*.

* **Xerotus lateritius.** B. & C.—No. 2563. Santee Canal. Ravenel.

105. **Xerotus viticola.** B. & C. *X. lateritius*, Rav. Fasc. iv. no. 3.—Pileo tenui nigro ramoso-sulcato scabro; margine pallidiore; lamellis latiusculis. No. 1975. Car. Inf. Curtis.

Pileus $\frac{3}{4}$ in. across, thin, black, ramoso-sulcate, rough; margin paler; gills rather broad.

* **Lenzites repanda.** Fr.—No. 3870. Alabama, Peters.

106. **Lenzites glaberrima.** B. & C.—Pileo suberoso, dilatato, e disco orbiculari, oriundo, sursum sulcato-zonato, albido, glaberrimo; lamellis poroso-anastomosantibus; interstitiis angustissimis. Santee River. Ravenel.

Pileus by confluence 7 in. across, 3 in. long, suberose, dilated, springing from an orbicular disc, sulcato-zonate above, whitish, quite smooth; gills poroso-anastomosing, interstices about $\frac{1}{2}$ in. wide.

* **Lenzites Klotzschii.** B.—No. 90. Car. Sup. Curtis. No. 968. Santee River. No. 5409. New England. Sprague.

* **Lenzites unguiaformis.** B. & C.—Kew Gard. Misc. i. p. 101.

Pileo ungulæformi, rugoso, pallido, e velutino glabrato; margine tenui; lamellis latis, poroso-ramosis, undulatis, acie acutis, tomentosis, antice rudimentariis. No. 24. Car. Sup. Curtis.

Pileus 2 in. across, $1\frac{1}{4}$ in. long, hoof-shaped, rugose, pallid, velvety, then becoming smooth; margin thin; gills broad, poroso-ramose, waved; margin acute, tomentose, rudimentary behind.

* **Lenzites Berkeleyi.** Lér.—No. 317. Car. Sup. Curtis. No. 4644. Alabama, Beaumont.

* **Lenzites Crataegi.** B.—Ohio, Lea. No. 2534. Car. Inf. On *Liquidambar*. No. 4278. Penns. Michener. No. 4480, on Birch; Car. Sup. Curtis. No. 4532. Alabama, Peters. No. 5856. Maine, Morse. No. 6169.

* **Lenzites corrugata.** Kl.—No. 1866, on Chestnut, Rhode Island, Bennett. No. 5661, 5802. New England, Sprague. It is *Dædalea zonata* of Schweinitz Herbarium.

* **Lenzites tricolor.** Fr.—No. 967, 1347. Santee River, Ravenel. No. 1391. Car. Inf. Curtis.

107. **Lenzites rhabarbarina.** B. & C.—Pileo reniformi, zonato, rugoso, e velutino subglabrato, rhabarbarino, fasciis rubris demum picto; lamellis subramosis, rhabarbarinis, acie laceratis. No. 3849, 4796, Car. Inf. Curtis. Allied to *L. sepiaria*.

Pileus reniform $1\frac{1}{4}$ in. across, $\frac{3}{4}$ in. long, zonate, rugose, velvety, then nearly smooth, rhubarb coloured, at length marked with red bands; gills sub-ramose, lacerated at the margin.

108. **Boletus Spraguei.** B. & C.—Pileo convexo, flavo, coccineosquamuloso; stipite flavo, coccineo-notato; poris viridi-flavis, amplis, angulatis, decurrentibus; velo tenui albo-evanescente; carne e flavo purpurascete. No. 5801 (cum icone). New Eng. Sprague.

Pileus above 3 in. across, convex, yellow, with crimson scales; stem yellow, dotted with crimson, $1\frac{1}{2}$ in. high, nearly $\frac{1}{2}$ in. thick above, attenuated below; pores greenish yellow, broad, angular, decurrent, the thin white veil evanescent; flesh yellow, becoming purplish; spores ochraceous.

109. **Boletus Curtisii.** B.—Pileo hemispherico, viscoso; stipite tenui, sursum attenuato, polito, reticulato; poris umbrinis, liberis. No. 3212. Car. Inf. Curtis. In pine woods.

Pileus 1 in. or more across, hemispherical, viscid; stem 2 in. high, $\frac{1}{8}$ in. thick, attenuated upwards, polished, reticulated; pores, umber, free; spores ferruginous.

110. **Boletus hemichrysus.** B. & C.—Pileo convexo, crasso, aureo-pulverulento; stipite subconcolore, deorsum pulveraceo; mycelio luteo; poris amplis, decurrentibus. No. 2928. Car. Inf. Ravenel. On roots of *Pinus palustris*.

Pileus $1\frac{1}{2}$ - $2\frac{1}{2}$ in. across, convex, thick, powdered with yellow; stem 1 in. high, $\frac{1}{4}$ - $\frac{1}{2}$ in. thick, nearly of the same colour, pulveraceous below; mycelium yellow; pores broad, decurrent.

111. **Boletus Ravenelii.** B. & C.—Pileo convexo, stipite tenui,

veloque sulfureo-pulverulentis; poris planis, umbrinis.—No. 1970. Car. Inf. Ravenel.

Pileus $1-1\frac{1}{2}$ in. across, convex; stem $1\frac{1}{2}$ in. high; $1\frac{1}{2}$ -3 lines thick, attenuated upwards, as well as the veil, sulphury-pulverulent; pores plane, umber.

112. **Boletus auriflammeus.** *B. & C.*—Pileo convexo, stipiteque sursum attenuato, aureo-pulverulentis; poris liberis, amplis, ore cinnabarinis. No. 6467. N. Car. Curtis.

Pileus 1 in. across, convex, and as well as the stem powdered with golden yellow; stem attenuated upwards, 1 in. high, with a strong depression round the top; pores free, broad, the orifices scarlet. A lovely species, allied to the two last.

* **Boletus calopus.** *Fr.*—No. 5720. New England. Sprague.

113. **Boletus retipes.** *B. & C.*—Pileo convexo, sicco, luteo-pulverulento; stipite subæquali, usque ad basin reticulato, deorsum pulverulento; poris luteis, adnatis. No. 6414. Car. Sup. Curtis. In grassy woods.

Pileus $1\frac{1}{2}$ in. across, convex, dry, powdered with yellow; stem 2 in. high $\frac{1}{4}$ - $\frac{1}{2}$ in. thick, reticulated to the base, pulverulent downwards; pores yellow, adnate. Pilei arising from a common base.

* **Boletus parasiticus.** *Bull.*—New. Eng. Sprague.

* **Boletus edulis.** *Bull.*—No. 5333. New England. Sprague. (cum icone.) This was returned with the name *B. alveolatus*, B. & C., but it is either *B. edulis* or very nearly allied.

* **Boletus Ananas.** *Curt.* Kew Gard. Misc. i. p. 101.—Pileo floccoso-verrucoso; floccis supra candidis, subtus carneis, margine lacerato, membranaceo; stipite candido; poris planis luteis. No. 1649. Santee River.

Pileus 2 in. or more across, floccoso-verrucose the flocci whitish above, flesh coloured beneath; margin torn, membranaceous; stem 4 in. high, white; pores plane, yellow; spores ferruginous.

* **Boletus felleus.** *Bull.*—No. 1283. Car. Inf. Curtis.

* **Boletus castaneus.** *Bull.*—No. 5738, 5748. New Eng. Sprague (cum iconibus).

114. **Boletus Murrayi.** *B. & C.*—Pileo hemispherico, crassissimo, vivide rubro, granulato; carne flava; stipite clavato, flavo, laevi; poris angustissimis, decurrentibus, flavis. No. 5742 (cum icone). New Eng. Murray.

Pileus $2\frac{3}{4}$ in. across, nearly $1\frac{1}{2}$ in. thick, vivid red, granulated; flesh yellow; stem clavate, yellow, even; pores about a line deep, decurrent, yellow. Spores, as in *B. castaneus*, pale yellow.

* **Strobilomyces strobilaceus.** *B.*—Ohio, Lea. No. 507. Car. Inf. Curtis. No. 3889, Texas. C. Wright.

115. **Polyporus (Mesopus) dibaphus.** *B. & C.*—Pileo orbiculari, atropurpureo, subtiliter tomentoso, glabrescente, lineis pallidis hic illic radiato; stipite gracili, subconcolore, deorsum pruinato;

poris decurrentibus, ochroleucis, angulatis, parvis. No. 6062, Alabama, Peters, on *Ilex opaca*.

Pileus 1 in. across; orbicular, dark purple, finely tomentose, becoming smooth, with here and there pallid radiating lines; stem slender, nearly of the same colour, pruinose downwards; pores decurrent, pale ochre, angular, small.

* **Polyporus (Mesopus) lepideus.** Fr.—No. 3068. Sartwell.

* **Polyporus (Mesopus) arcularius.** Fr.—No. 3142. Texas, C. Wright. Car. Inf. Ohio, Lea.

116. **Polyporus (Mesopus) dependens.** B. & C.—Pileo turbinate, ferrugineo, sericeo-striato, stipite brevi, villosa, e basi spongiosa oriundo, porisque angulatis, parvis, concoloribus. No. 3691. Car. Inf. Curtis. On the under side of pine logs.

Pileus $\frac{1}{2}$ in. across, turbinate, ferruginous, silky-striate; stem $\frac{1}{3}$ in. high, about a line thick, villous, springing from a spongy base; pores angular, small, of the same colour. Hymenium sometimes proliferous.

* **Polyporus (Mesopus) Schweinitzii.** Fr. = *P. tabulæformis*, B. No. 3920. Car. Inf. Curtis. No. 4280. Penns. Michener.

* **Polyporus (Mesopus) lentus.** B.—No. 5596. Connecticut. C. Wright.

117. **Polyporus (Mesopus) luridus.** B. & C.—Pileo orbiculari, umbilicato, fusco, pulverulento, margine incurvo; stipite cylindrico, subconcolore; poris cinereis, parvis, angulatis. No. 5598. Conn. C. Wright. Wisconsin, Lapham.

Pileus 1-1 $\frac{1}{2}$ in. across, orbicular, umbilicate, brown, pulverulent, sometimes rugose, margin incurved; stem $\frac{1}{2}$ - $\frac{3}{4}$ in. high, 2 lines thick, rooting; pores ash colored, small, angular.

* **Polyporus (Mesopus) rufescens.** Fr.—No. 1953, 2089, 2125, 2581, 2147. Car. Inf. Curtis. No. 3616. Penns. Michener.

118. **Polyporus (Mesopus) persicinus.** B. & C.—Pileo molli, tomentoso, pulvinato, atropurpureo; stipite, crasso, concolore; poris, angulatis; carne rubidâ, sub-cuticulâ atropurpureâ, quandoque zonatâ. No. 2945. Car. Inf. Ravenel.

Pileus 4 in. or more across, often oblique, soft, tomentose, pulvinate, dark purple; stem 2 in. high, 1 $\frac{1}{2}$ in. thick, concolorous; pores angular, $\frac{1}{50}$ in. across, flesh-red, dark purple beneath the cuticle; sometimes zoned.

* **Polyporus (Mesopus) tomentosus.** Fr.—No. 5699. New Eng. Sprague.

* **Polyporus (Mesopus) Boucheanus.** Fr. No. 738. Car. Sup. No. 2482. Car. Inf. Curtis, No. 5595. Conn. C. Wright. No. 6201. New Eng. Sprague. Ohio, Lea. Like many other species of this section, frequently pleuropous.

119. **Polyporus (Mesopus) delicatus.** B. & C.—Pileo orbiculari, ochraceo, tomentoso; margine tenui, acuto; stipite brevi, radi-

cante ; poris angulatis, dissepimentis tenuibus, usque ad basin decurrentibus. No. 4512. Alabama, Peters.

Pileus $\frac{3}{4}$ in. across, orbicular, ochraceous, tomentose ; margin thin, acute ; stem $\frac{1}{4}$ in. high, 2 lines thick, rooting ; pores angular, dissepiments thin, decurrent to the very base, $\frac{1}{80}$ in. across.

* **Polyporus (Mesopus) ovinus.** Fr.—No. 1034. Car. Inf. Curtis. Ohio, Lea.

120. **Polyporus (Mesopus) flavo-virens.** B. & Rav.—Pileo molli, irregulari, pulvinato; vel depresso, subtiliter tomentoso, flavo-viridi ; stipite pallido, sub-concolore, crasso ; poris irregularibus, dissepimentis tenuibus flavis. No. 5659. New Eng. Sprague.

Pileus 3-4 in. across, soft, irregular, pulvinate or depressed, delicately tomentose, greenish-yellow ; stem pallid, 2 in. high, $\frac{1}{2}$ in. thick ; pores irregular, $\frac{1}{80}$ in. across, dissepiments thin, yellow.

* **Polyporus (Mesopus) confluens.** Fr.—No. 1622, Car. Inf. Ravenel.

* **Polyporus (Mesopus) leucomelas.** Fr.—No. 5662. New Eng. Sprague. Ohio.

121. **Polyporus (Mesopus) cupulæformis.** B. & C.—Rav. Fung. Car. Fasc. i. no. 10. Pileo cupulæformi demum reflexo, rufo tomentoso ; stipite brevissimo ; poris minimis, concoloribus. No. 1209. Car. Inf. Curtis, on *Rhus copallina*.

Pileus a line or more across, cupulate, at length reflexed, rufo-tomentose ; stem scarcely a line high, $\frac{3}{4}$ thick ; pores minute, about $\frac{1}{160}$ in. across, concolorous. Stem and pileus sometimes white with age.

* **Polyporus (Pleuropus) Curtisii.** B.—Kew Gard. Misc. i. p. 101. Pileo excentrico, molli-suberoso, sulcato, zonato, ochroleuco, hic illic sanguineo-laccato ; stipite elongato, rugoso, sanguineo-laccato ; hymenio ex albo ochraceo ; poris punctiformibus.

Pileus 3-6 in. across, eccentric, between soft and corky, sulcate, zoned, pale ochre, here and there red-laccate ; stem 2-5 in. high, $\frac{1}{2}$ -1 in. thick, rugose, laccate ; hymenium white, then ochraceous ; pores punctiform.

* **Polyporus (Pleuropus) luteus.** Nees.—No. 2256, Car. Inf. Curtis.

122. **Polyporus (Pleuropus) Ravenelii.** B. & C.—Pileo sub-flabelliformi, demum lobato, zonato, albido, lineato-sericeo ; stipite albo, pruinato, poris ochroleucis, minimis. No. 2859. Car. Inf. Ravenel.

Pileus 1-1 $\frac{1}{2}$ in. across, sub-flabelliform, at length lobed, zoned, whitish, with silky lines ; stem $\frac{3}{4}$ in. high, 2-3 lines thick, white, pruinato ; spores pale-ochrey, $\frac{1}{120}$ in. across. Allied to the last.

123. **Polyporus (Pleuropus) mutabilis.** B. & C.—Pileo flabelliformi, zonato, postice pallido, antice rufo, sericeo-striato ; stipite variabili ; poris minimis, ochroleucis. No. 2943. Car. Inf. Ravenel.

Pileus $2\frac{1}{2}$ in. across, very variable, sometimes much elongated, flabelliform, zoned, pallid behind, rufous in front, silky striate; stem variable, obsolete or much elongated; pores minute, $\frac{1}{150}$ in. across, pale ochre. The same species occurs on Rio Negro. *Polyporus fibroso-radians*, Mont. is very near, but if the same not the typical form.

124. **Polyporus (Pleuropus) fractipes.** B. & C.—Ochraceus; pileo reniformi, irregulari, rugoso, tomentoso, hic illic hispidulo; stipite irregulari distorto, quandoque postice adnato, pulverulento; poris minimis. No. 2858. Car. Inf. Ravenel. No. 4706. Car. Inf. Curtis.

Pileus nearly 2 in. across, reniform, irregular, rugose, tomentose, here and there hispid, ochraceous; stem $1-1\frac{1}{2}$ in. high, 2-4 lines thick, irregular, distorted, sometimes adnate behind, pulverulent; pores minute, $\frac{1}{120}$ in. across.

125. **Polyporus (Pleuropus) dealbatus.** B. & C.—Rav. fasc. 3, No. 10. Pileo convexo, zonato, quandoque sulcato, dealbato; stipite elongato, distorto, pruinoso; hymenio concavo, albedo; poris microscopicis. No. 1524. Santee River, Ravenel. On the ground in woods.

Pileus $\frac{3}{4}-1\frac{3}{4}$ in. wide, convex, zoned, sometimes sulcate, becoming whitened; stem $2\frac{1}{2}$ in. high, $\frac{1}{4}$ in. or more thick, distorted, pruinose; hymenium concave, whitish; pores microscopical, $\frac{1}{200}$ in. across. Sometimes mesopodous.

A NEW BRITISH WEISSIA.

Weissia truncicola. De Notaris, *Epilogo della Briol. Ital.*, p. 598 (Journ. Bot., 1871, pl. cxix., f. 2). Dioicous? in large dense tufts, interwoven at base with branched radicles, bright green. Stem innovating dichotomously, 1-2 in. high, flexile, reddish, bearing lax radicles at the lower part from the axils of the leaves. Leaves approximated, erect when moist, and often somewhat secund on the second shoots, rather soft, papillose at back, from a narrowly lanceolate base, gradually subulate, channelled, with a thin nerve reaching the apex, the margin not revolute, sharply denticulate above, and on the back of the nerve; when dry strongly cirrhate and twisted. Cells at base large cylindrico-vesicular, the rest small, quadrate, or subhexagonal, filled with deep green chlorophyll.

Growing in expanded tufts, like *Weissia cirrhata*, the leaves resembling those of *Weissia Bruntoni*, but longer, and the margin not revolute.

HAB. On the base of the trunk of an oak in Lower Nuthurst, Sutton Park, Birmingham. (J. Bagnall, Aug. 27, 1870.) Identical with original specimens gathered by Carestia in the Val d'Intrasca, near Verbano. R. Braithwaite, M.D., in Journ. Bot. 1871, p. 289.

BRITISH FUNGI.

By M. C. COOKE.

*Gasteromycetes.***Lycoperdon Hoylei.** *B. & Br.* "Hoyle's Lycoperdon."

Peridium stipitate, subglobose, bristling with elongated rigid brown warts, sterile base small, confluent with the capillitium, spores globose, echinulate, lilac.—*B. & Br., Ann. N. H., No. 1307.*

On the ground.—Reading (Mr. Hoyle). Oct.

Stem 1 in. high, $\frac{3}{4}$ in. thick, lacunose, olivaceous within; peridium 2 in. across; warts $1\frac{1}{2}$ -2 lines high; capillitium and spores lilac; spores $\cdot 00015$ in; mycelium threadlike, white.

Scleroderma geaster. *Fr.* "Stellate Scleroderma."

Sessile, sub-globose, growing pallid, peridium dehiscing at the apex in stellate laciniae; inner mass dirty purplish black; spores globose, verrucose. *Fr. S. M., iii., p. 46.* *B. & Br. Ann. N. H., No. 1308.* *Seem. Journ. Bot. ix. t. 116, Trans. Woolh. Club, 1870, No. 252, plate.* *Lycoper. rotundum, &c. Mich. t. 99, f. 1.*

On the ground. Near Hereford (Dr. Bull). Oct.

Geaster tunicatus. *Vitt.* "Tunicated Geaster."

Outer peridium splitting to the middle in rather large laciniae, internal stratum thick, evanescent. Capitulum sessile; peridium flaccid, mouth minute, conico-fimbriate, circumscribed by a paler, scarcely determinate zone; columella with a long pedicel.—*Vitt. Mon. p. 18, t. 3, f. 3.* *B. & Br. Ann., N. H., No. 1306.* *Geaster lageniformis, Cooke, Hdbk. No. 1079.*

Amongst Rhododendrons.

Messrs. Berkeley and Broome seem to regard this as the correct determination of the species described in Cooke's Handbook, No. 1079, under the name of *Geaster lageniformis*. Not having seen specimens we accept their decision.

Badhamia capsulifer. *B.* "Capsular Badhamia."

Peridium sessile or very shortly pedicellate, spherical, or ovoid, bluish-black, or blue-grey, dehiscing irregularly, seated on a whitish membrane; spores globose, pale brown, endochrome granular. *Berk. Trans. Linn. Soc. xxi., p. 154.* *Sphaerocarpus capsulifer. Bull: t. 470, f. 2.* *Trichia capsulifera. D.C. Fl. Fr. ii., 254.* *Physarum capsuliferum Chev. Par. i., p. 339.*

On living leaves of *Tussilago petasites*. Cheshire (T. Brittain.)

Perichæna quercina. *Fr.* "Oak Perichæna."

Peridia globose, yellow; somewhat lacerated, flocci and spores yellow.—*Fr. S. M., iii., 192.*

On oak trunks. Autumn. Rare.

Detected by Mr. T. Brittain near Manchester, and determined by C. E. Broome, Esq., on whose authority it is inserted, as we have never seen specimens.

NOVARA DIATOMS.

Descriptions of New Genera and Species of Diatoms obtained by the Austrian Imperial Frigate Novara, during her Voyage round the World.

By HERR A. GRUNOW.

(Translated by F. KITTON.)

PART I. (with Plate ii.)

(Continued from page 32.)

Orthonais binotata, *Grun.* = *Cocconeis binotata* = *C. scutellum*, γ, Roper, Mic. Jour. vol. vi. 6, pl. 3, f. 9.

Var. ? atlantica.—Valves ovate, sometimes lanceolate ovate, striato-punctate, delicate, marginal marking elongate. [Pl. 2, f. 11, *a b c*.]

On *Sargassum bacciferum* in the Atlantic Ocean.

Mastogloia marginulata, *Grun.*, n. sp.—Minute, valves narrow, lanceolate, obtuse; marginal loculi minute 30—33 in. .001; striæ transverse, delicate, 60 in. .001; central nodule small, oblong. [Pl. 2, f. 12, *a b*.]

On *Sargassum plumosum*, from New Zealand, and not uncommon on Algae from the Island of Tahiti.

Pleurostauron Frauenfeldianum, *Grun.*, n. sp.—Small valves narrow, lanceolate, somewhat acute; stauros broad, dilated toward the margin; striæ delicate, transverse. [Pl. 2, f. 13, *a b c d*.]

Fossil in Essebaren Erde (Bergmehl) from Java.

(= *Stauroneis scaphulæformis*, Greville, Mic. Jour. vol. xiv. pl. 9, f. 32, differs from *S. legumen* var. of Lewis, in the ends of the stauros being dilated. F. K.)

P. javanicum, *Grun.*—Large; valves lanceolate; apices somewhat obtuse; stauros broad, dilated towards the margin; striæ transverse, punctate, 33—100". [Plate 2, f. 14.]

Bergmehl, Java.

(This form is identical with *S. phænecenteron*, Ehr., and the Synopsis. Smith's specific characters are "lanceolate, obtuse; stauros linear, reaching the margin; striæ 33 in. .001; length .0055 to .0066." Grunow gives the length of his specimens as .0056" to .006". F. K.)

Stauroneis oblonga, *Grun.* n. sp.—Small, valves broad, linear, oblong; apices rounded; stauros narrow, linear, reaching the margins of the valves; striæ punctate, delicate, 40 in. .001. [Pl. 2, f. 15, *a b*.]

Bergmehl, Java.

Resembles my *S. bacillum*, but differs in its greater breadth and more conspicuous striation.

Navicula Javanica, *Grun.*, n. sp.—Valve convex, narrow, lanceolate, somewhat acute, a well-marked undulating line on each side

of the median line; median and central nodules oblong; striae reaching median line, delicate, 50 in. $\cdot 001''$. [Pl. 2. f. 16, *a b*.]

Bergmehl, Java.

Distinguished by the well-marked undulating sub-marginal lines from any other species of *Navicula*. (The outline of the valve and the undulating lines seem to show some affinity with the genus *Cylindrotheca*, a genus, however, with which I am only acquainted by name. F. K.)

Navicula pacifica, *Grun.*—This form is not described in the text. [Pl. 2, f. 17.]

Pleurosigma australe, *Grun.*, n. sp.—Small, narrow, lanceolate, sub-sigmoid; apices somewhat acute; median line gracefully sigmoid; central nodule round; striae oblique, delicate, 55—60; colour of dry frustule yellowish-brown. [Pl. 2, f. 18.]

On *Ballia Callitricha*, from New Zealand.

Resembles *P. Æstuarii*, but is smaller, and not of the pale purple of that species, but a yellowish-brown. And as it can be compared with no other of Smith's species of *Pleurosigma*, I am reluctantly obliged to describe this uncharacteristic species as new.

Diadesmis confervacea, *Kütz. Bacill. T. 1, f. 8.*—[Pl. 2. f. 19, *a b*.] Amongst *Cladophora Roettleri*, Kütz. and fresh water. Rio Janiero.

The valves closely enough resemble Kützing's fig. and description to warrant our referring this form to Kützing's species.

The striae are 56 to 60 in. $\cdot 001''$.

D. peregrina, *W. Smith, Ann. of Nat. His.*—[Pl. 2, f. 20, *a b*.] Tahiti.

The specimens from Kew Gardens, London, have enabled me to obtain a view of the valve, and I am satisfied of their identity with the Tahitan form.

As this species is but little known I have given figures of valve and filament.

The valves are stout, ovate, sometimes nearly rhomboid, often with slightly produced apices; median nodule distinct. The striae are delicate, above 60 $\cdot 001''$.

It resembles *Navicula brachysira*, Breb., and it must not be overlooked that this form also occurs in short filaments, produced by the cohesion of the smaller valves.

CRATICULA, *Grun.*, Gen. Nov.—Frustules naviculoid, valves double, outer valve? furnished with central and terminal nodules, punctatostriate; interior valve surirellæform, costate; costæ linear, distinct, reaching median line, for the most part wanting from the central portion.

Craticula Perrotettii, *Grun.*, n. sp.—Valve lanceolate; apices shortly produced, obtuse; longitudinal lines distinct, 24 in. $\cdot 001''$; transverse, 48 in. $\cdot 001''$, costæ 7-4 in. $\cdot 001''$ [Pl. 2, f. 21, *a* internal valve, *b* external do.]

From Senegal, amongst *Nitellæ*, Perrotet.

To this species belong some of the earlier species of *Surivella*, viz. :—

S. Craticula, Eh. = *C. Ehrenbergii*, Grun.

S. megaloptera, Eh. = *C. megaloptera*, Grun.

S. procera, Eh. = *C. procera*, Grun.

C. Perrotettii is distinguished from the above by its distinct longitudinal striae. *S. Craticula* has already been figured with a distinct central nodule, as a variety, Greg. Mic. Jour. vol. ii., pl. 4, f. 6. With careful examination it may always be observed, my figure of *Navicula rhyncocephala*, var. α and β . in Verh. Wien, zool.-bot. Gesellsch, 1860, t. 4, f. 31, α and c are outer? valves of *C. Ehrenbergii*. The position of the genus *Craticula* still requires consideration.

(Prof. H. L. Smith, in his new Conspectus of the families and genera of Diatomaceæ deletes the genus *Craticula*, and unites it with Greville's genus, *Stictodesmis*. F. K.)

Figures 23 and 24, although occurring in the original plate, do not represent diatoms, but are two species of *Oscillaria*.

NOTE ON ACALYPTOSPORA.

Acalyptospora nervisequia.—In the 10th volume of the "Ann. Sc. Nat.," at page 343, an elaborate description is furnished by Desmazieres of an original structure found on the leaf of the elm, which he regards as a fungus of the Family Coniomycetes, and has named *Acalyptospora nervisequia*. Berkeley and Broome, in the 15th vol. of the "Annals of Natural History," record it as occurring at Apethorpe, in Northamptonshire, and remark that it looks like a short obtuse Puccinia, and that it closely resembles a gland. In the "Handbook of British Fungi" it is stated to be intermediate between Torulacei and Pucciniæi, and to appear to be more closely allied to the former than the latter. A diligent examination of the leaves of the common elm has left me without any doubt that this so-called Fungus is simply a glandular hair. It occurs on every leaf of the common elm in all stages of its growth, from its first expansion to its fall. By macerating the leaf in liquor potassæ, and subsequent washing with water, the tissues are rendered transparent, when the object is seen plainly to be a process of the cuticle as much as any other hair on the surface of the leaf, and to have none of the characters of a fungal growth. I am strengthened in this view of the matter by finding on the leaves of *Vicia faba*, *Agrimonia Eupatoria*, *Sambucus nigra*, *Anagallis arvensis*, and *Solanum Dulcamara*, similar growths, which are, I presume, regarded without dispute as glandular hairs. C. J. MÜLLER.

[N.B.—Has our correspondent examined specimens of *Acalyptospora*, published by Desmazieres himself, and compared them with his glandular hairs?—Ed. Grev.]

THE GENUS TETRAPEDIA (*REINSCH*) WITH TWO NEW FORMS. (Plate iii.)

By WILLIAM ARCHER.

Amongst unicellular Algæ falling under the class Chlorophyllaceæ, forms with specially figured cells—that is, otherwise than globular, ellipsoidal, or cylindrical, with more or less abruptly or broadly rounded ends—are, as is well known, numerous; but amongst such plants belonging to the class Phycocchromaceæ, so frequently found in the same situations associated with the foregoing, so far as I am aware, not until recently has attention been drawn to any examples of a specially figured outline.

It does not appear, until the genus *Tetrapedia* was founded by Professor Reinsch* for two new and singular exceedingly minute chroococcaceous forms, that examples of specially figured forms were known in this family of Algæ. Inasmuch as Reinsch's work is but little known in this country, and as I have on one occasion encountered his *T. Crux-Michaeli* in this country, and am acquainted with two other forms of a kindred nature, it has appeared to me that a brief notice thereof might find a fitting place in these pages, accompanied by a reproduction of Reinsch's plate, and a sketch of my own forms, reserving a fuller description and details to be published elsewhere, in deference to the limited space which can be devoted to this subject in this Journal.

The description given by Reinsch of his genus is as follows :—

Class. Phycocchromaceæ.

Family. Chroococcaceæ.

Genus. *Tetrapedia*, *Reinsch*.

Cellulæ solitariae aut rarius consociatione individuorum plurium familias ex cellulis binis, quaternis aut 16is exstitutas constituentes, in sciagraphia quadratica, cellula singula incisuris quaternis in cellulas filias quaternas dilapsa, cellulæ filiae post divisionem individuos singulas se præbentes, incisurarum directio in marginum lateralium directione perpendiculari aut in angulo semirectangulo versa; cellularum interanea granulosa, colore aerugineo.

So far as our acquaintance with these little Algæ reaches there appear to exist four (if not five) distinct, yet kindred forms of *figured* "Chroococcaceæ"—their remarkable shapes preclude their being regarded as "Lichen-gonidia," but whether mature plants or stages in the growth of any more complicated structure remains a problem. Ours are at least forms which here and there recur, and one can at once recognise them as always offering the same characteristics and as maintaining their apparent individuality. Whether they are "species" or not, it may be a matter of convenience, should observers meet them elsewhere, and be able to throw a light upon them, to have at least a means of their recognition; for these reasons it occurs to me as desirable (at least, provi-

* "Die Algenflora des mittleren Theiles von Franken," by Prof. Paul Reinsch. Nürnberg, 1867, p. 37, t. ii. f. 2, and t. i. f. 6.

sionally) to record them under Reinsch's genus, if indeed that observer may not consider it unallowable so far to modify the terms thereof as to admit of its embracing the two new forms. It may be objected that the very name of the genus would preclude the admission of a *three*-lobed form into it, but the name *Staurastrum* is retained though only a minority of the forms referable thereto are cruciate or quadrangular in end view, so also with *Triceratium*, where four and five-angled forms occur, &c. I venture, therefore, to cast the description of these forms as follows:—

Tetrapedia (Reinsch) mut. quodammodo char.

Cells compressed, quadrangular or triangular, equilateral, becoming subdivided into quadrate or cuneate segments, or rounded lobes, either by deep vertical or oblique incisions, or by wide angular or rounded sinuses.

Tetrapedia gothica. *Reinsch.*—Cells quadrate, angles rounded, lateral margins emarginate at the middle, whereat afterwards deeply incised, each of the four roundly angled quadrate segments thus produced becoming equal in dimensions to the original cell, and their lateral margins emarginate at the middle, whereat afterwards also deeply incised; each of the sixteen (secondary) roundly angled quadrate segments thus produced becoming equal in dimensions to the original cell, and their lateral margins emarginate at the middle (whereat afterwards incised?); all the incisions perpendicular to the sides, rounded below, somewhat wide, of an equal average width throughout; ultimately a quadrate foramen through the cell at the central points of junction of the segments (the incisions afterwards completed and the segmented tablet breaking up?); in side view the single cell oblong at the middle, slightly concave at each side, ends rounded. [Pl. iii. figs. 1-7.] Diameter of single cell about $\frac{1}{4}165$ to $\frac{1}{3}125$ ".

In a ditch and in a mill-race (scantly) near Erlangen.

It seems to be probable that another distinct form exists—that figured by Reinsch (op. cit. t. ii. f. 2. i.), and reproduced in our plate [Pl. iii. f. 8]. Should that form recur to him, probably he may be in a position to throw further light on it on a future occasion.

Tetrapedia Crux-Michaeli. *Reinsch.*—Cells quadrate, lateral margins entire, with two shallow concavities, each extending half the length of the side, thus producing an obtuse-angled central prominence, deeply incised at the angles, incisions diagonal, rectilinear, deep, acute below, slightly expanding upwards, thus bisecting the angles, and dividing the cell into four broadly cuneate segments, the upper angles of which are subacute (the incisions ultimately completed, and the cell breaking up?); in side view lanceolate, ends acute. [Pl. iii. f. 9-10.] Diameter of cell about $\frac{1}{3}125$ to $\frac{1}{2}083$ ".

In running water (very scantily) near Erlangen, also (very scantily) near Mullingar, Co. Westmeath, Ireland.

Tetrapedia Reinschiana. *nov. sp.*—Cells quadrangular, two opposite margins excavated by a wide triangular sinus, thus subdividing the cell into two broadly cuneate segments connected by a wide isthmus, and somewhat convex on their lower margins; the other two opposite margins of the cell, that is the upper margins of the segments, very slightly concave at the middle, somewhat raised towards the acute outer angles; in side view oblong, constricted at the middle, ends rounded. [Pl. iii. f. 11-13]. Diameter of largest cell met with (from angle to angle in both directions equal) from about $\frac{1}{2500}$ " to one-third, or even one half smaller.

In moor pools, Co. Dublin and Wicklow.

Tetrapedia setigera. *nov. sp.*—Cells triangular, the lateral margins somewhat deeply excavated by a broad rounded sinus dividing the cell into three lobes, rounded at the ends, and each terminated by a very delicate straight bristle, in length about equal to the diameter of the cell; in side view oblong, somewhat inflated at the middle at each side, ends rounded, and each seen tipped by the bristle. [Pl. iii. f. 14-17.] Diameter of cell (without bristles), about $\frac{1}{4000}$ to $\frac{1}{3400}$, from end to end, including the bristles about $\frac{1}{1850}$ to $\frac{1}{1180}$ ".

In moor pools, Co. Dublin and Wicklow.

Reinsch's figures are so much enlarged that they are calculated to mislead. In the present plate they are reduced into uniformity with our own to a scale of some 400 diameters. The descriptions of his forms are a direct translation, somewhat altered in order, from the original.

Pl. iii. f. 1, *Tetrapedia gothica*, Reinsch, a single developed cell, whose lateral margin presents the indication of division.

F. 2. A cell with the indication of division, the angles bluntly rounded.

F. 3. A cell [the division] somewhat more advanced.

F. 4. A four-celled family, the [secondary] cells still connected in the middle by the angles, the depth of the incisions almost their breadth, the individual cells fully formed, *i. e.*, already with the commencement of a division into a new cell-generation, the margin of the side-lobes of the [secondary] cells somewhat emarginate at the middle.

F. 5. A four-celled family, the tablet furnished in the middle with a quadrangular hole (Loch).

F. 6. A sixteen-celled family formed from four smaller families, still connected at the corresponding angles, all the cells of like figure and presenting the indication of continuous division.

F. 7. Side view of a cell.

F. 8. A four-celled family of peculiar form, which, perhaps, represents a distinct species, of which, however, I [Prof. Reinsch] have observed but a single specimen, the cell cruciate, formed of four semicircular lobes, but whether the cells present the de-



1



2



3



4



5



6



7



8



9



10



11



12



13



14



15



16



17



18



veloped condition, or the condition of beginning of a new division, I [Prof. Reinsch] do not venture to decide; the dimensions as in a four-celled family of the ordinary form.

F. 9. *Tetrapedia Crux-Michaeli* (Reinsch)—an individual in the state as observed, showing the division furthest advanced.

F. 10. Side view of the same individual.

F. 11-12. *Tetrapedia Reinschiana* (Arch). Front or broad view.

F. 13. The same. Side view.

F. 14-16. *Tetrapedia setigera* (Arch). Front or broad view.

F. 17. The same. Side view.

(Fig. 18 represents an example of the spore and adjacent heterocysts of a minute Nostoc, the subject of a communication in No. 1 (p. 10) of this Journal.—W. A.)

LICHENS IN SOWERBY'S HERBARIUM.

The Rev. J. M. Crombie, M.A., F.L.S., commenced in the "Journal of Botany" for August a series of papers on the Lichens contained in Sowerby's Herbarium, illustrative of the figures in "English Botany," viz:—

1. **Lichen plicatus.** *E. B. t.*, 257. = *Usnea barbata*, var. *plicata*.

2. **Lichen ochroleucus.** *E. B. t.*, 2374 = *Alectoria ochroleuca*. Ehrb.

3. **Lichen sarmentosus.** *E. B. t.*, 2040. = *Alectoria Cincinnata*. Fr.

4. **Lichen jubatus.** *E. B. t.*, 1880. = *Alectoria jubata*. L. The upper figure—usually referred to var. *chalybeiformis*, L., as in Hook. Br. Fl. ii., p. 227, seems rather to belong to var. *lanestræ*, Ach. "A smaller state, with shorter and more slender branches, densely entangled." No specimen, however, is extant in Sow. Herb., either of this or of true *chalybeiformis*.

5. **Lichen lanatus.** *E. B. t.*, 846. = *Alectoria lanata*. L. The middle figure may be accepted as the type. The upper figure represents a good variety = var. *parmelioides*. Cromb. MSS. To the typical form, as a young condition, is also to be referred *Lichen scaber*. *E. B. t.*, 2318.

6. **Lichen stictoceros.** *E. B. t.*, 1353. = *Evernia prunastri*, var. *gracilis*. Ach.

7. **Lichen fastigiatus.** *E. B. t.*, 890. = *Ramalini fastigiata*. P., and *Ramalina fraxinea*, Q. The lower left hand figure = *R. fastigiata*. Of the two other figures, the upper is a smaller state of *R. fraxinea*, and the lower apparently a hybrid between them.

8. **Lichen pollinarius.** *E. B. t.*, 1607. = *Ramalina evernioides*. Nyl.

9. **Lichen pinastri.** *E. B. t.*, 211. = *Platysma juniperinum** *pinastri*. Appears by a note to have been figured from a specimen

in the herbarium of Linnæus. The *Lichen juniperinus* of E. B. t. 194, is only a state of *Physcia parietina*.

10. **Lichen sepincola.** E. B. t., 2386. = *Platysma sepincola*, Ehr., and var. *ulophylla*, Ach., fig. 1, represents the type from near Yarmouth; fig. 2, from a Continental specimen; fig. 3, from Scotland, is var. *ulophylla*.

11. **Lichen fahlunensis.** E. B. t., 653. = *Platysma commixtum*. Nyl.

12. **Lichen aleurites.** E. B. t., 858. = *Platysma diffusum*. Web. of which *Parmelia placorodia* (Ach) Nyl. is a synonym.

13 **Lichen resupinatus.** E. B. t., 305. = *Nephromium lusitanicum*. Schær. The specimen drawn is from Cornwall.

14. **Lichen spongiosus.** E. B. t., 1374. = *Solorina limbata*. Smrft. The figure in E. B. is not very characteristic, and is too deeply coloured.

Lichenologists are recommended to consult this paper for the sake of the valuable notes not included in this brief abstract.

CRYPTOGAMIC LITERATURE.

PILOBOLUS. Pringsheim's Jahrbucher, B viii., Hft. 3, contains a copiously illustrated paper, by Julius Klein, entitled "Zur Kenntniss des Pilobolus."

BRITISH LICHENS. The "Journal of Botany" for August contains the first of a series of papers, by the Rev. J. M. Crombie, M.A., on "The Lichens in Sowerby's Herbarium."

FUNGI AUSTRIACI. Three fascicula of Austrian Fungi have already been published by Baron Thuemen, of Teplitz, at a reasonable price; others are in preparation.

HEDWIGIA, Nos. 5, 6, 7, contain notices of recent Cryptogamic papers and communications, together with an enumeration of specimens published in recent fasciculi.

GIORDANO, G. C. Prima contribuzione alla flora briologica Napolitana. Naples, 1871.

BOTANISKA NOTISER (1872), Nos. 1, 2, 3, contains several short cryptogamic papers, amongst which is one by J. M. Norman, entitled "Cives novi lichenosæ arcticæ Norvegiæ."

SAUTER, Dr. A. E. Flora des Herzogthums Salzburg, v. Theil. Die Flechten. Salzburg, 1872.

ZEITSCHRIFT des Allgem, Osterrach, Apotheker-Vereines, Vienna, 1872, contains "Beitrag zur Kenntniss einiger geniesserer Schwämme," by Jos. Fuchs.

THE LENS, No. 3, for July, 1872, contains "Algæ Rhodiaceæ, a list of Rhode Island Algæ," by Stephen T. Olney. A continuation of the "Conspectus of the Families and Genera of the Diatomaceæ," by Prof. H. L. Smith. "Fungi in Cow's Milk," by James Law. "Puccinia on Paper" (but not a *Puccinia*), by Thomas Taylor.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY,
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By THE REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 39.)

126. **Polyporus (Pleuropus) Amygdalinus.** *B. & Rav.*—Olidus; pileo carnoso, subimbricato, laterali, luride-flavo, hic illic squamis omnino adnatis, obscurioribus notato; stipite obsoleto; poris sinuosis, irregularibus, parvis, albis; No. 1153. Car. Inf. Ravenel. On rotten oak logs.

Pileus 3 inches across, fleshy, somewhat imbricated, of a dull yellow, with adpressed dark scales; stem rudimentary; spores $\frac{1}{50}$ inch across, waved, irregular. Smells strongly of vanilla or bitter almonds.

* **P. (Pleuropus) rhipidius.** *B.*—*Rav. Fung. Car. Fasc. 1, No. 9.* No. 1719, Car. Inf. Curtis. Ravenel. Ohio, Lea. No. 5070, New England, Sprague. Has a wide subtropical range.

* **P. (Merisma) cristatus,** *Fr.*, No. 6218. Wisconsin, Lapham.

127. **P. (Merisma) subgiganteus.** *B. & C.*—Pileo dilatato, lobato, flexuoso, rugoso-undulato, villosa-scabro, margine inflexo; poris irregularibus; dissepimentis, tenuibus, No. 5594. Conn., C. Wright.

Pileus some inches across; 2 long, lobed, flexuose, ragged and waved, clothed with down which becomes in parts shortly strigose or scabrous; margin inflected; pores $\frac{1}{50}$ inch across, but very variable; dissepiments thin. Flesh compact, not fibrous.

* **P. (Merisma) anax.** *B.*—No. 547. Car. Sup. Curtis. Ohio, Lea.

* **P. (Anodermei) lacteus.** *Fr.*—No. 899, Car. Inf. Ravenel. on pine logs. No. 1863, Rhode Island, Bennett. No. 5390, New Eng., Sprague.

* **P. (Anodermei) epileucus.** *Fr.*—No. 2366, Car. Inf. Curtis.

* **P. (Anodermei) testaceus.** *Fr.*—No. 4279. Penns., Michener.

* **P. (Anodermei) borealis.** *Fr.*—No. 2941, 4771. Car. Inf. Curtis, 3576, 3617. Penns., Michener.

* **P. (Anodermei) tephroleucus.** *Fr.*—No. 4282, Penns. Michener; on Liriodendron.

128. **P. (Anodermei) semisupinus.** *B. & C.*—Ochraceus, pileo è resupinato reflexo, tenui, fibris paucis, brevibus, ornato, postice laccato-glabrato, poris minutis, dissepimentis tenuibus. No. 5860. New Eng. Sprague.

Pileus $\frac{1}{3}$ inch across, pale ochre, at first resupinate, thin clothed with a few short fibres, smooth as if very thinly laccate behind; pores $\frac{1}{80}$ inch wide, but variable, with thin dissepiments. No. 6054. Alabama, Peters, is a form of the same species.

* **P. (Anodermei) pallescens.** *Fr.*—No. 6216. Wisconsin, Lapham.

129. **P. (Anodermei) cerifluus.** *B. & C.*—Ochroleucus; pileo sessili, dimidiato, angusto, hic illic laccato-glabrato; hymenio cribroso; poris angulatis, dentatis, minutis. No. 2926. Car. Inf. Ravenel.

Pileus 1 inch across, often laterally confluent, sessile, dimidiate of a slightly ochraceous white, here and there smooth as if thinly laccate; hymenium cribose; pores angular, minute; $\frac{1}{90}$ inch wide; dissepiments toothed.

130. **P. (Anodermei) Lindheimeri.** *B. & C.*—Pileo albido, subcinereo, floccoso, substrigoso; hymenio cinereo; poris minutis, angulatis. No. 3639. Texas, Lindheimer, on *Laurus Sassafras*.

Pileus $1\frac{1}{4}$ inch wide, $\frac{1}{2}$ long, often laterally confluent, dirty white, tinged with ash-colour, floccose, here and there slightly strigose; hymenium cinereous; pores $\frac{1}{100}$ inch wide, angular.

* **P. (Anodermei) amorphus.** *Fr.*—No. 1502. Car. Inf. Curtis. No. 2023. Car. Inf. with a pale purplish black hymenium.

131. **P. (Anodermei) Spraguei.** *B. & C.*—Pileo imbricato, pruinoso-scabro, rugoso; margine lobato, intus zonato, umbrino fibroso, rigescente; hymenio concavo; poris minutis. No. 5700, 5718. New Eng. Murray.

Pileus 3 inches across, $1\frac{1}{2}$ long, rigid when dry, imbricated, rugose, pruinoso-scabrous; margin lobed; flesh umber, fibrous, at length blackish; pores $\frac{1}{100}$ inch wide; hymenium concave.

* **P. (Anodermei) crispus.** *Fr.*—No. 4281. Penns. Michener on *Carya*.

132. **P. (Anodermei) fissilis.** *B. & C.*—Albus; pileo dimidiato, vertice elongato rugoso hic illic aculeato-setoso; intus fibroso, fissili, zonato, poris subrotundis, acie obtusiusculis; Kew Gard. Misc., v. i., p. 234. 1441, Car. Sup.

Pileus 6 inches wide, 2 long, sparingly aculeato-setose, at length quite smooth and reddish; strongly zoned within; flesh coarsely fibrous; pores $\frac{1}{20}$ inch wide. Allied to *P. labyrinthicus*, but the surface is different, and the texture looser and darker.

* **P. (Placodermei) senex.** *Mont.*—No. 1558. Santee River.

* **P. (Placodermei) dryadeus.** *Fr.*—No. 3094. New Eng. Oakes. *P. dryadeus*, Schwein, is *P. scruposus*, *Fr.*, which occurs in many parts of the United States, on various trees as *Rhus toxic*-

codendron, *Castanea*, *Quercus*, and seems to be the same with *P. gilvus*.

* **P. (Placodermei) cervinus.** *Nees.*—No. 5218. Alabama, Peters, on lime.

* **P. (Placodermei) fulvus.** *Fr.*—No. 5991, 6013. Penns. Michener, on *Liriodendron*.

133. **P. (Placodermei) novæangliæ.** *B. & C.*—Pileo reniformi, disco pulvinato affixo, ferrugineo, velutino; hymenio concolore; poris parvis; dissepimentis rigidis. No. 5807. New Engl.

Pileus $\frac{3}{4}$ inch wide, laterally confluent, kidneyshaped, fixed by a cushion-like disc, velvety, ferruginous; hymenium of the same color; pores $\frac{1}{60}$ inch wide; walls rigid.

* **P. (Placodermei) carneus.** *Fr.*—Rav. Fung. Car. Fasc., 5. No. 14. No. 1160, Car. Inf. Curtis, 3462. New York, Sartwell.

134. **P. (Placodermei) cucullatus.** *B. & C.*—Pileo minuto, ungulæformi, e ferrugineo tomentoso, nigro glabro; poris parvis; hymenio primum margine breviter porrecto, limitato. No. 5382. New Eng. Sprague.

Pileus $\frac{5}{12}$ — $\frac{1}{2}$ inch wide, ferruginous, tomentose; then black and smooth; hymenium bordered by a projecting margin; pores angular, $\frac{1}{70}$ inch wide.

135. **P. (Placodermei) palustris.** *B. & C.*—Pileo pulvinato, cuticulâ lævi ochroleucâ viestito; hymenio convexulo; poris parvis, angulatis. No. 1566. Santee River. On *Pinus palustris*.

Pileus 2 inches across, 1 long, pulvinate covered with a smooth ochre-white cuticle; hymenium slightly convex; pores $\frac{1}{60}$ inch wide, angular. Resembles *P. betulinus*.

* **P. (Inodermei) crocatus.** *Fr.*—No. 2927. Car. Inf. Ravenel.

* **P. (Inodermei) floridanus.** *B. Rav. Fung. Car. Fasc., i.* No. 11. No. 1563. Santee River. No. 2016. Car. Inf. Curtis on *Rhus radicans*. No. 2328, Car. Inf. On oak.

* **P. (Inodermei) cinnabarrinus.** *Fr.*—Rav. Fung. Car. Fasc. 2, No. 17. No. 452. Car. Sup. Curtis on cherry.

* **P. (Inodermei) valenzuelianus.** *Mont.*—No. 974, 976. Santee River. Curtis.

* **P. (Inodermei) elongatus.** *B.*—No. 5988. Penns. Michener. On chesnut.

* **P. (Inodermei) biformis.** *Fr.*—*P. Caroliniensis.* *B. & C. Rav. Fung. Car. Fasc., 2.* No. 2178. Car. Inf., Curtis. On oak. 3615, Penns., Michener, 4560. Alabama, Beaumont, 6042. Penns. Michener. On oak and *Liquidamber*.

136. **P. (Inodermei) Sartwellii.** *B. & C.*—Dimidiatus, postice decurrens; pileo albido, zonato, velutino-strigoso; poris angulatis elongatis nigris. No. 3446. New York, Sartwell; 5272. New Engl., Sprague.

Pileus 1-2 inches wide, $\frac{1}{2}$ inch long, dimidiate, decurrent behind, dirty white, zoned, clothed with velvety down, which is here and there matted and strigose; pores $\frac{1}{40}$ inch wide, angular, elongated.

137. **P. (Inodermei) scarrosus.** *B. & C.*—Ochraceus; pileo dimidiato, postice decurrente, fibris radiantibus stuppeo; poris decurrentibus elongatis, angulatis. No. 4935. Car. Sup. Curt. On twigs of *Liriodendron*.

Pileus $\frac{1}{2}$ inch wide, $\frac{1}{4}$ long, ochraceous; dimidiate, decurrent behind, clothed with radiating towlike fibres; pores $\frac{1}{36}$ inch wide, elongated, angular, decurrent.

* **P. (Inodermei) radiatus.** *Fr.*—*Pol. fusco-gilvus*, Schwein Herb. No. 4424. Car. Sup. Curtis. On birch. 5418. New Engl. Sprague; 5804, New Eng., Murray; Ohio, Lea.

138. **P. (Inodermei) ectypus.** *B. & C.*—Pileo flabelliformi, lobato, zonato-picto, postice rufo, antice pulverulento, pallido; hymenio ochraceo; poris minutis. No. 2942. Car. Inf., Ravenel.

Pileus 3 inches wide, $2\frac{3}{4}$ long, deeply lobed, fanshaped, zoned, rufous behind, pallid and pulverulent in front; hymenium ochraceous; pores $\frac{1}{60}$ inch wide. Looks at first like some form of *P. versicolor*, but is very different.

* **P. (Inodermei) nigro-purpurascens.** *Schwein.*—No. 6171. Car. Inf. Perhaps referrible to *P. amorphus*.

139. **P. (Inodermei) Halesiæ.** *B. & C.*—Pileis imbricatis, postice decurrentibus, pallidis, sericeis; margine tenui, inflexo; hymenio cinereo; poris minutis. No. 2027, 2028. Upper Georgia. Ravenel. On *Halesia tetraptera*.

Pileus 1 inch wide, $\frac{1}{2}$ inch long, imbricated, decurrent behind, pallid, silky; margin thin inflected; hymenium ash-coloured; pores $\frac{1}{60}$ inch wide. Ravenel compares this with *P. amorphus*, but it seems very different, the pores being deficient in the peculiar waxy appearance which characterises that species.

* **P. (Inodermei) pinsitus.** *Fr.*—No. 11. Car. Sup. Curtis.

* **P. (Inodermei) barbatulus.** *Fr.*—Rav. Fung. Car. Fasc., 2. No. 19. No. 6376. Texas, Bigelow.

* **P. (Inodermei) decipiens.** *Schwein.*—No. 4339. Penns. Michener. No. 4737. Car. Inf. Curtis.

140. **P. (Inodermei) Illicincola.** *B. & C.*—Rav. Fung. Car. Fasc. 5., No. 17. Pileo flabelliformi, pallido, glabrato nitido radiato ruguloso; poris pallidis sinuatis. Alabama. Peters. On bark of *Ilex opaca*.

Pileus $\frac{3}{4}$ inch wide and long, flabelliform, but frequently laterally confluent, pallid, at length quite smooth, marked with little radiating lines; pores $\frac{1}{72}$ wide, sinuated. Hymenium much like that of *P. abietinus*.

* **P. (Inodermei) Xalapensis.** *Berk.*—In Hook. Kew. Misc., i., p. 103. Thin membranaceous; pileus flabelliform, variously lobed,

2-4 inches long, pale, silky, at length nearly smooth and shining, repeatedly but delicately zoned; hymenium white; pores small; dissepiments very thin and delicate, soon torn, and toothed so as to present the appearance of a Hydnum. Car. Inf. Curtis.

* **P. (Inodermei) chartaceus.** *B. & C. l. c.*—Effused for many inches, and completely surrounding the smaller branches, broadly reflexed; margin membranaceous but rigid; obscurely zoned, dirty white, slightly silky, but by no means hairy or bristly; pores $\frac{1}{50}$ inch wide, soon broken into obtuse lamellar processes. Allied to *P. pinsitus*.

141. **P. (Ruspinati) favillaceus.** *B. & C.*—Brevis, sparsus; margine liberato, tomentosus; hymenio cinereo; poris minimis. No. 5266. New Eng., Sprague. Consisting of little scattered patches; margin at length free and tomentose; hymenium ash-coloured; pores $\frac{1}{150}$ inch wide. Parasitic, together with a minute Hydnum, on some indeterminable resupinate Polyporus.

* **P. (Resupinati) niger.** *B.—Hook, Lond. Journ.*, v. 4., p. 304. *Rav. Fung. Car. Fasc. 1, No. 20.* Ohio. *Lea.* Elongated, margin free, dark brown, pubescent; hymenium jet black; pores very minute, punctiform,umber within.

142. **P. (Resupinati) aurantio-pallens.** *B. & C.*—Suborbicularis. margine elevato obtuso cinctus; poris parvis. No. 2600. Car. Inf. On pine. About an inch wide; margin obtuse raised; pores $\frac{1}{50}$ inch wide. Allied apparently to *P. bombycinus*

143. **P. (Resupinati) chrysobaphus.** *B. & C.*—Totus resupinatus, immarginatus, aureo-olivaceus; poris elongatis obliquis; sporis ferrugineis. No. 6342. Alabama. Peters.

Entirely resupinate without any distinct margin; of a golden yellow, inclining to olive; pores elongated, oblique, $\frac{1}{32}$ inch wide; spores ferruginous.

* **P. (Resupinati) xanthus.** *Fr.*—No. 2356. Car. Inf. On pine. 2442. Car. Inf. On oak. 3873, 5220. Alabama. Peters.

* **P. (Resupinati) spissus.** *Fr.*—No. 5803. New Eng. Sprague. 6000, Penns. Michener.

* **P. (Resupinati) cruentatus.** *Mont.=Boletus spissus*, Schwein. No. 2012. Car. Inf. On oak.

* **P. (Resupinati) fusco-carneus,** *P. Rav. Fung. Car. Fasc. 1. No. 15.* No. 5592. Connect. C. Wright.

* **P. (Resupinati) salmonicolor.** *B. & C.—Hook. Kew. Misc.*, 1. p. 104. Totus resupinatus e mycelio tenui albo oriundus; poris primum subcarneis, demum elongatis nigrescentibus. No. 1527. Santee River. Ravenel. On charred wood.

Several inches broad, thin near the margin, of a rich salmon colour, at length brown. Pores $\frac{1}{8}$ inch wide; very tender when young. Allied to the three last.

144. **P. (Resupinati) barbæformis.** *B. & C.*—Totus resupinatus

margine tenui, albo; hymenio fulvo; poris parvis, elongatis, dissepimentis tenuibus. No. 4519. Alabama., Peters. On vine.

Wholly resupinate with a thin white margin; hymenium tawny; pores $\frac{1}{8}$ inch wide, but variable in size. No. 4266. Penns., Michener. appears to be a form of the same species, with the margin free and elevated, and the dissepiments elongated and toothed.

* **P. (Resupinati) contiguus.** Fr.—Rav. Fung. Car. Fasc., 1. No. 16. P. ambiens. B. & C. No. 1468. Car. Inf., 2300. On oak. 252 on *Cyrilla*. 3655. Louisiana. Dr. Hall. 3906, 3907. Texas.

* **P. (Resupinati) incarnatus.** Fr.—No. 2741. Car. Inf. On pine.

* **P. (Resupinati) farinellus.** Fr.—No. 2246. Car. Inf. Curtis. On pine. No. 2042, 2081, 2264. Car. Inf. On oak.

145. **P. (Resupinati) clathratus.** B. & C.—Niveus, effusus, late cribrus; parietibus cribrorum laccato-lævibus; poris punctiformibus, dissepimentis crassis obtusis. No. 3656. Louisiana. Dr. Hale. Widely effused, the hymenium with large apertures, the walls of which are smooth and honey colored. Pores $\frac{1}{2}$ inch wide.

* **P. (Resupinati) cremor.** B. & C.—Rigidus, brevis, discincola, totus resupinatus; poris suborbicularibus; dissepimentis crassiusculis, obtusis. No. 1074. Car. Inf. On oak branches, especially on the disc where branches have been broken off. About an inch broad, consisting almost entirely of tubes. Pores $\frac{1}{2}$ inch wide, nearly round.

146. **P. (Resupinatus) Lindbladii.** B.—Pileo resupinato, rigido; margine tomentoso albo demum libero; hymenio griseo, fuscescente; poris angulatis. No. 1623. Car. Inf. Spreading for some inches; of a peculiar grey tint. Pores $\frac{1}{6}$ inch wide. The Carolina specimens are a little darker than those originally received from Sweden.

147. **P. (Resupinatus) limitatus.** B. & C.—Totus resupinatus rigidus allidus; margine nigrescente rimoso; poris angulatis. No. 2686. Car. Inf. entirely resupinate, the margin thin, barren, and cracked. Pores $\frac{1}{6}$ inch wide.

* **P. (Resupinati) Stephensii.** B. & Br.—Rav. Fung. Car. Fasc. 4, No. 7. On *Taxodium distichum*.

148. **P. (Resupinati) salviæ.** B. & C.—Effusus, mollis, albus, fere totus é poris minimis flexuosis constitutus; dissepimentis tenuibus. No. 2602. Car. Inf. On *Salvia*, surrounding the branches, consisting almost entirely of the minute flexuous pores; dissepiments thin; pores $\frac{1}{10}$ inch in diameter. Allied to *P. vaporarius*.

149. **P. (Resupinati) incrustans.** B. & C.—Mollis, albus; quiquilias incrustans; mycelio gossypino; poris brevibus angulatis; dissepimentis tenuibus. No. 5671. New Eng. Murray.

Running over grass and various substances, after the fashion of *Thelephora sebacea*; white, soft, springing from a thin cotton-like mycelium; pores $\frac{1}{8}$ inch wide, short, angular, with thin dissepiments.

BRITISH FUNGI.

By M. C. COOKE.—(Continued from page 40.)

*Hymenomycetes.***Agaricus (*Lepiota*) *Georginæ*. Smith.** "Crimson-tinged *Lepiota*."

Pileus white, slightly fleshy, fragile, at first campanulate, then expanded, covered with a minute, dense, viscid pruinosity, which, as well as the white flesh, instantly changes to crimson when touched; margin at length striate; stem slightly attenuated upwards, also covered externally with minute, viscid pruinosity, changing to crimson when touched; ring evanescent; gills free, very thin, moderately distant, somewhat ventricose, white, the edge becoming crimson when touched; spores white.—*Smith in Seem. Journ. Bot.* ix. (1871), p. 1, t. 112.

On mosses in a cool fernery. Chelsea.

Pileus $\frac{1}{2}$ to 1 in. across. Stem 1-2 in. long. Spores $\cdot0003 \times \cdot0002$ in.

Agaricus (*Lepiota*) *metulæsporus*. B. & Br. "Clavate-spored *Lepiota*."

Pileus campanulate, rather fleshy, white, grooved, adorned with small pallid scales; margin appendiculate; stem nearly equal or slightly clavate; pallid, lemon-coloured, stuffed; gills white, ventricose, approximate; spores nine-pin shaped, or obliquely clavate; mycelium thread-like.—*B. & Br. Ceylon Fungi*, no. 67. *Ann. N.H.* no. 1182.

Pileus 1 in. across; stem $2\frac{1}{2}$ in. high, 1 line thick; gills nearly 2 lines broad. This species, which at present has been found only once in this country by Mr. Broome, and which in external characters approaches *A. clypeolarius*, is at once distinguished by the length of the spores, which is $\cdot0006$ in.—*B. & Br.*

Agaricus (*Lepiota*) *Terreii*. B. & Br. "Terry's *Lepiota*."

Pileus sub-hemispherical, bright tawny, rough with minute warts; stem sub-equal, clad with furfuraceous scales of the same colour; ring at length torn; gills white, narrow, remote.—*B. & Br. Ann. N.H.* no. 1183.

On sandy ground. Forres.

Pileus 1-2 in.; gills not branched; spores $\cdot0002 \times \cdot00015$ in. This species, which appears quite distinct, approaches *A. granulosus* on one side, and *A. acutesquamosus* on the other, but it is nearer to the latter than the former. The spores of *A. granulosus* are slightly larger, those of *A. acutesquamosus* are rather longer, and at the same time narrower.—*B. & Br.*

Agaricus (Lepiota) ermineus. *Fr.* "Ermine Lepiota."

Pileus fleshy, even, smooth, at length silky about the margin; stem fistulose, equal, smooth; ring erect, becoming lacerated; gills approximate.—*Fr. S. M.* ii. p. 22. *Sv. Bot.* t. 596. f. 1. *Krombh.* t. 25. f. 34, 35. *Fr. Ep.* p. 15. *B. & Br. Ann. N. H.* no. 1184.

In grassy places. Coed Coch.

Fragile, wholly white, inodorous, with the taste of radishes. Krombholz says that the spores are fusiform.

Agaricus (Lepiota) ramentaceus. *Bull.*—*Bull.* t. 595. f. 3. *Agaricus (Armillaria) ramentaceus.* *Cooke, Hdbk.* no. 35.

Under trees. Coed Coch.

In the "Handbook," No. 35, this is referred to *Armillaria*.

Agaricus (Lepiota) sistratus. *Fr.* "Fibrous-ringed Lepiota."

Pileus fleshy, rather thin, campanulate, pruinose; stem sub-fistulose, equal, ring and stem below it, fibrillose; gills nearly free, ascending, white.—*Fr. S. M.* 1. p. 24. *Fr. Ep.* p. 18. *B. & Br. Ann. N. H.* no. 1185. bis.

On sandy ground. Forres.

This pretty species is remarkable for the filamentous ring.

Agaricus (Lepiota) delicatus. *Fr.* "Delicate Lepiota."

Pileus somewhat fleshy, convexo-plane, smooth, even, viscid; stem fistulose, squamulose; ring densely floccose; gills free, crowded, thin.—*Fr. S. M.* i. p. 23. *Fr. Ep.* p. 20. *B. & Br. Ann. N. H.* no. 1186.

About an old stump. Sept. Powerscourt.

Pileus hemispherical, obtuse, rivulose, viscid, smooth, pallid, 1 in. across; stem $\frac{1}{2}$ in. high $\frac{1}{4}$ in. thick, transversely punctate, squamulose, stuffed with flocci, white above; veil floccose, slightly appendiculate; gills free, rounded behind, approximate, pallid. The veil is really double, floccose, covered with scaly particles. Taste like *Polyporus squamosus*.—*B. & Br.*

Agaricus (Armillaria) robustus. *A. & S.* "Robust Armillaria."

Pileus fleshy, compact, convexo-plane, unequal, smooth; stem solid, short, attenuated downwards, rooting, fibrillose above the ring, white below; gills emarginate, reaching the stem.—*A. & S.*, p. 147. *Fr. S. M.* i. p. 26. *Fr. Ep.* p. 21. *Krombh.* t. 25. f. 15-20. *Br. Bath Trans.* 1870, p. 59.

In woods, &c. Leigh Down, Bristol.

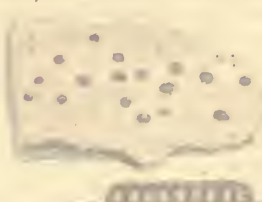
Short, robust, pleasant; pileus bay, tawny, or reddish, variable in size.

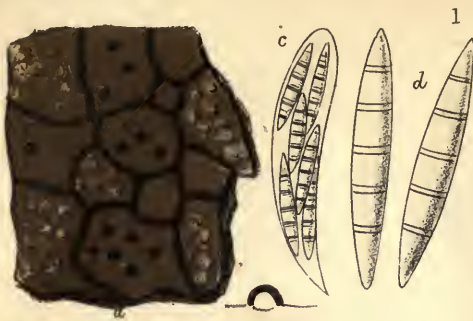
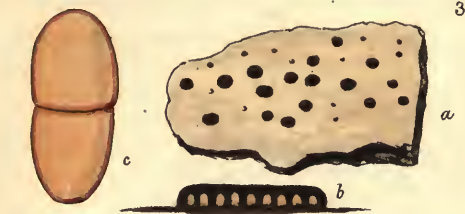
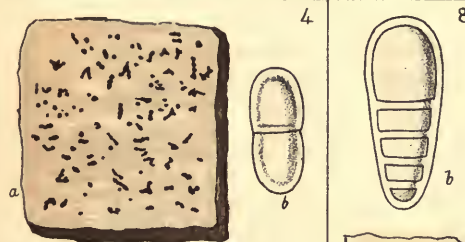
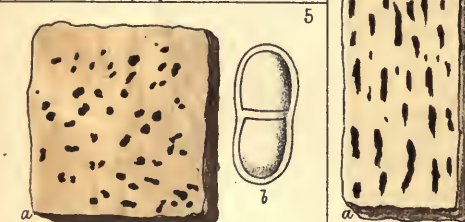
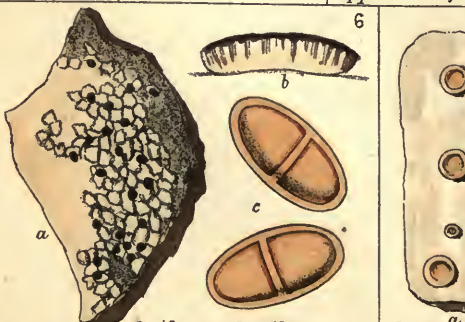
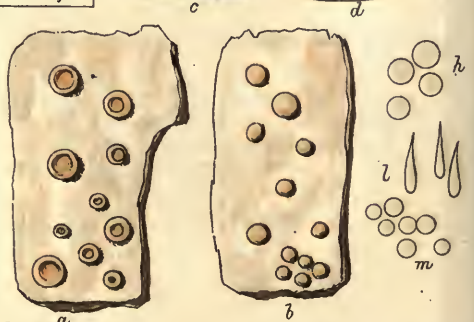
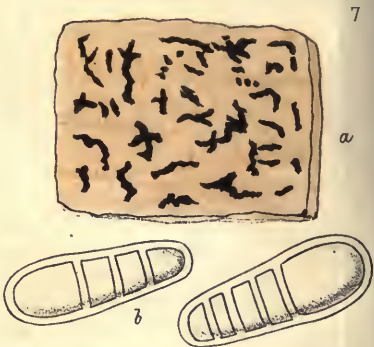
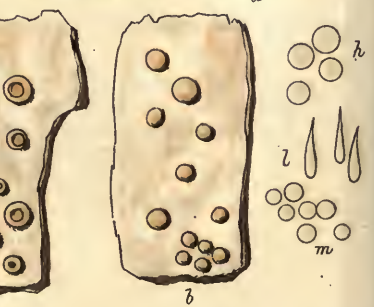
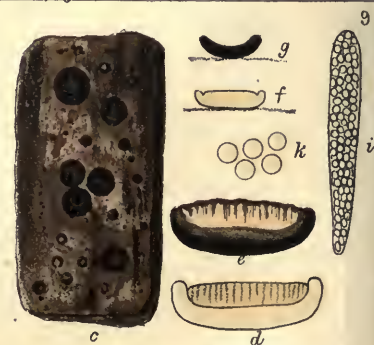
Agaricus (Armillaria) denigritus. *Fr.* "Smutty Armillaria."

Pileus hemispherical, obtuse, fleshy, tawny; flesh whitish; stem subequal, solid; striate above the ring, white; gills adnexed, tawny.—*Fr. in Mus. Suec.* *B. & Br. Ann. N. H.* no. 1187.

On a grass plot near shrubs. Coed Coch.

At first sight very like *A. Leveillei*, but the white spores at once distinguish it.—*B. & Br.*



*Verrucaria horistica*. Lght.*V. antecellens*. Nyl.*Arthonia proximella*. Nyl.*A. aspersella* Lght.*A. vinosa* var *pineti*. Körb*Lecidea occulta* (Körb)*L. resinæ* (Fr.)*A. opegraphina*. Ach.

LICHENOLOGICAL MEMORABILIA.—No. 2.

By the REV. W. A. LEIGHTON, B.A., F.L.S., F.B.S.Ed.

The Lichens of Bettws-y-Coed, North Wales.

A fortnight's sojourn, in the month of June, 1872, amongst the magnificent and romantic rocks and woods surrounding Bettws-y-Coed, in the valley of the Conway, is, in itself, a thing long to be treasured in the memory; but to the lichenist, who finds those rocks and woods abounding with rare and beautiful lichens, it is "a beauty and a joy for ever."

As a general rule, mere lists of localities of plants are scarcely advisable, but the knowledge of lichens, and of their distribution over the British Isles, is as yet so incomplete and imperfect, that a deviation from this rule may be possibly pardoned. Assuming this, I proceed to enumerate the lichens which I observed and collected in this circumscribed nook of lovely scenery.

The Collemacei, curiously enough in so damp a locality, seem to be comparatively rare, *Collema flaccidum*, ACH., barren as usual, but abundant; a few plants of *Collema nigrescens*, L., sterile; *Leptogium lacerum*, (ACH.), sterile; and a single specimen of the rare *Leptogium Burgessii*, (LIGHTF.) in fine fruit, being all their representatives. *Calicium hyperellum*, ACH., was the only representative of the Caliciei, though I think I also observed the barren thallus of *Coniocybe furfuracea*, ACH. *Cladonia squamosa*, HFFM., and *Cladonia digitata*, HFFM., var. *macilenta*, HFFM., f. *carcata*, ACH., occurred in surpassing beauty and luxuriance on the trunks of trees, at the Conway Falls, together with well-fruited *Usnea barbata* f. *hirta*, FR.; and *Cladonia cervicornis*, SCHÆR., in equal luxuriance on the rocks above the Gwydir woods. *Stereocaulon nanum*, ACH., very fine, and abundant, but sterile as usual. *Ramalina farinacea*, (L.), large and abundant but sterile, and *Ramalina fastigiata*, FR., finely fruited. A single specimen *in fruit!!* of *Cetraria aculeata*, FR., was gathered on the rocks. *Nephromium lusitanicum*, SCHÆR., was most abundant, in fine fructification in all the woods, especially in the Gwydir woods, where the trees were clothed with it. *Peltigera horizontalis*, (L.), and *P. scutata*, (DICKS.), were not unfrequent, the latter sterile. *Stictina limbata*, (SM.), *Stictina fuliginosa*, (DICKS.), and *Stictina scrobiculata*, (SCOP.), and *Sticta pulmonacea*, ACH., very fine and luxuriant, but always sterile, were abundant, and *Ricasolia latevirens*, (LIGHTF.), in fine fructification, but partial. Of *Parmelia*, the following were noticed: *caperata*, (L.), *olivacea*, (L.), *physodes*, (L.), and its variety *labrosa*, ACH., clothing the young trees, one specimen in fruit, *perlata*, (L.), *fuliginosa*, DUB., corticole in fruit, *conspersa*, EHRH., and its form *Mougeotii*, SCHÆR., *saxatilis*, (L.), corticole form in good fruit, and its variety *omphalodes*, (L.), also in fruit, *Borreri*, f. *olivacea*, LEIGHT., and *tiliacea*, (ACH.). *Umbilicaria polyphylla*, (L.), f. *lacera*,

LEIGHT., sparingly. *Pannaria triptophylla*, (ACH.), sterile, and *Pannaria plumbea*, (LIGHTF.), in most luxuriant fruit, abounded on the trees. In *Lecanora* the following occurred, *expallens*, ACH., *tartarea*, L., f. *grandinosa*, ACH., *ventosa*, L., *sulphurea*, HFFM., very perfect, *Dicksonii*, (ACH.), *subfusca*, L., f. *allophana*, ACH., abundant and fine. *Pertusaria* yielded *communis*, D.C., and *leio-placa*, (ACH.), but a few specimens of the uncommon *Phlyctis argena*, (ACH.) were met with, and *Thelotrema lepadinum*, ACH., in tolerable quantity. *Lecidea sanguineo-atra*, ACH., was abundant on one or two elms, *Lecidea pineti*, (SCHRAD.), at the bases of Scotch firs. This lichen has been now ascertained to be identical with *Peziza diluta*, PERS., and it must consequently henceforth bear the name of *Lecidea diluta*, (PERS.). Its synonymy is *Peziza diluta*, Pers. Syn. 668 (1801); *Lichen pineti*, Schrad. in Ach. Meth. 68 (1805); *Biatorina pineti*, Mass. Ric. 135; Körb. Syst. 189, Par. 136; *Biatorina diluta*, Th. Fr. Lich. Arct. 185; *Lecidea pineti*, Leight. Lich. Fl. 317—and *Exsiccati*, Rabh. 906. Zw. 83. Mudd. 145., Hepp. 136., Nyl. 56. Schaer. 218. Leight. 89. A few very poor specimens of *Lecidea panæola*, FR.; *L. myriocarpa*, D.C.; one or two bits of *L. carneola*, ACH.; and on the rocks, but rare, a *Lecidea* altogether identical with a specimen in my herbarium from Dr. Lahm, of *Buellia occulta*, Körb. Par. 186, collected near Heidelberg, by Von Zwackh. As this has never before been noticed in Britain, I add its characters:—

***Lecidea occulta*.** (KÖRB.)—Thallus pallido-lutescent, effuse, adnate, thin, minutely areolate, areolæ somewhat convex; hypothallus dark; apothecia very minute, adnate, nigro-fuscous, at first margined by the thallus, eventually free and somewhat convex, proper margin more or less visible; epithecium fuscous; paraphyses indistinct; hypothecium lutescent; spores 8, fuscous, small, oblong, 1-septate.

Thallus tinged yellow with K, and on immediate subsequent application of C still yellow, but soon obliterated (Ky C—). It may be well to state that my herbarium contains a similar lichen gathered at Diganwy, near Conway, in 1851.

See plate 4, fig. 6, *a* thallus nat. size, *b* section of apothecium, *c* spores, magn. 1200.

This *Lecidea* bears a considerable general external resemblance to *L. stellulata*, TAYL., but that has a white thallus, and a dark hypothecium, and different reaction, keeping them distinct.

A very interesting and instructive series of forms of *Lecidea resinæ*, FR., occurred on the resin issuing from the spruce fir-trees. Its normal condition may be seen in plate 4, fig. 9 *a*, in which the apothecia were pale yellowish-brown, adnate and plane, variable in size. A section of the apothecium (fig. 9, f. & d.) showed a pale yellow hypothecium, with a darker yellow hymenium, consisting of distinct slender paraphyses, and linear asci, containing innumerable spherical colourless spores (fig. 9, i. & h.) The spermogonia were

tubercular, of similar colour with the apothecia, and contained sterigmata (fig. 9, l.), and small spherical colourless spermatia (fig. 9, m.). A biatorine state sparingly occurred, represented in Leight. Exs. 277. In the cicatrices, where branches had been broken away, the resin assumed a brownish, or greenish brown, or even purplish hue, through discoloration from some unascertained cause, and here the apothecia and spermogonia became black, the former being much more concave, and even in some cases somewhat stipitate, the epithecium shining (fig. 9, c. & g.). A section of the apothecium exhibited a nigrofuscous hypothecium, and a dark epithecium (fig. 9, e.), and the spores (fig. 9, k.), were slightly smaller than those of the normal state. There is, however, no reason to imagine that these are distinct plants, but merely states of one and the same lichen, transitional forms having been observed. The dark form may be named forma *cicatricicola*, LEIGHT. The normal state is the *Peziza resinæ* of Fries, and the spermogonia the *Sphæria resinæ* of the same writer. I subsequently found *L. resinæ* in both its forms on the spruce firs in Glanartro, the woody valley leading to Cwm Bychan near Barmouth.

The Graphideæ were very plentiful; *Graphis elegans*, (Sm.), *G. scripta*, ACH., in its forms *diffusa*, LEIGHT.; *varia*, LEIGHT., *flexuosa*, LEIGHT., and *divaricata*, LEIGHT.; and its varieties *serpentina*, ACH., and *pulverulenta*, ACH. *G. inusta*, ACH., f. *simpliciuscula*, LEIGHT. *G. sophistica*, NYL., in its forms *radiata*, LEIGHT., and *divaricata*, LEIGHT., and its variety *pulverulenta*, (Sm.). *Opegrapha atra*, PERS., and its forms *parallela*, LEIGHT., *denigrata*, ACH., and *arthonoidea*, LEIGHT. *Opegrapha Turneri*, LEIGHT., *Opegrapha vulgata*, ACH., and *Opegrapha saxicola*, ACH., f. *gyrocarpa*, (Zw.), very sparingly. *Stigmatidium Hutchinsiae*, LEIGHT., clothed the shaded rocks in profuse perfection and beauty. *Arthonia lurida*, ACH., and *Arthonia vinosa*, LEIGHT., and its var. *pineti*, KÖRB. (fig. 5), plentiful. The latter *Arthonia* may be readily distinguished from its congeners by a section of the ardelta turning vinous or red-purple in hydrate of potash. *Arthonia astroidea*, ACH., and var. *opegraphina*, ACH. (plate 4, fig. 7 a. & b.); not unfrequent. It should be here observed that the variety *opegraphina*, ACH., and also the var. *epipastoides*, NYL. (plate 4, fig. 8, a. & b.), appear to be erroneously joined to *A. astroidea*, ACH. (see Leight. Lich. Fl., p. 397), inasmuch as they possess spores different from those of *A. astroidea*, and in all respects assimilating those of *Arthonia cinnabarina*, WALLR., viz., obovato-clavate, rounded at the extremities, 4-septate, the uppermost cell largest, and occupying nearly half of the spore, and the other cells in the lower half. (Plate 4, fig. 7 b, & 8 b.), of which they are no doubt states or forms, and to this species they must in future be referred. *Arthonia epipasta*, (ACH.); *Arth. cinnabarina*, WALLR., var. *anerythrea*, NYL., f. *detrita*, T. & B.; and the following, which I believe are new to Britain:—

Arthonia proximella, NYL.—Thallus effuse, hypophlæodal, silvery-grey; ardellæ nigro-fuscous or black, minute, round, lecideoid, opaque, plane, internally nigrescent; spores 8, fuscous, obovate, 1-septate.

On holly, rare. Gwydir woods.

SYN.—Nyl. Lich. Scand. p. 262. (1861).

FIG.—Plate 4, fig. 3., a. b. c.

EXS.—Fellman 208.

Arthonia aspersella. LEIGHT, n. sp.—Thallus pale-yellowish, maculari-effuse; ardellæ very minute, scattered, punctiform, linear or angulari-confluent, black or nigro-fuscous; hymenium untinged by K; spores 8, colourless, obovate, 1-septate.

On holly; Gwydir woods.

This lichen assimilates in general aspect with *A. vinosa*, var. *pineti*, but in that the ardellæ are roundish, and the hymenium is tinged red-purple with K.; whilst in *aspersella* the ardellæ are remarkable for a peculiar sharp angularity, and the hymenium is untinged by K. (Plate 4, fig. 4, a. & b.)

On one rock in the Gwydir woods, I met with, what I believe to be, the sterile thallus of *Arthonia decussata*, Fw., which is perfectly identical with Zwackh 10. A. & B., and Mass. 123, and has similar reaction K—C red. This is new to the British Flora, and is mentioned here to induce further research for fructified specimens.

Endocarpus fluviatile, (D.C.), in small quantities on wet rocks. *Verrucaria epidermidis*, ACH., f. *fallax*, NYL.; *V. punctiformis*, ACH., *V. antecellens*, NYL. (Leight. Lich. Fl. G. B.), see plate 4, fig. 2, a. b. c., and to which as *Exsiccati* may be quoted Zw., 363, A. & Hepp. 954, rather abundant on hollies. The cells of the spores have a singular tendency to become spuriously septate; *V. biformis*, BORR.; *lectissima*, (FR.), very plentiful; *V. chlorotica*, (ACH.), and its f. *carpineae*, SCHÆR.; *V. nitida*, (Weig.) especially plentiful, and also a remarkable form or state, on old laurel and other trees, having a nigro-fuscous thallus resembling an indeterminate, diffuse, dark-brown, oily stain, which may be named f. *elæodes*, LEIGHT.; *V. horistica*, LEIGHT. (Lich. Fl. G. B., 451), abundant on rocks. (Plate 4, fig. 1, a. b. c. d.)

I may mention that the duplicates of the above collections will be made up into a few sets for distribution at 30s. per 100 specimens. First applicants will have the most complete sets.

OLD NETTLE STEMS AND THEIR MICRO-FUNGI is the title of a communication, by the Editor, which appears in the current number of the Journal of the Quekett Microscopical Club. It contains also a paper by C. H. Peck on *Cucurbitaria morbosea*, Schwein.

NEW BRITISH LICHENS.

Communicated by the REV. J. M. CROMBIE, M.A., F.L.S.

The following *new species* of British Lichens have been described by Dr. Wm. Nylander, in the "Flora," 11th August, 1872 :—

1. **Obryzum dolichoteron.** *Nyl.*—Parasitic on the lobes of *Collema auriculatum*, var. *pinguiscens*, *Nyl.* Similar to *O. corniculatum*, but with the spores longer, 3-5 septate, cylindrico-oblong, 0,023-27 mm. long, 0,0045-50 mm. thick. On shady calcareous rocks of Craig Tulloch, Blair Athole (Crombie, August, 1870).

2. **Lecidea asemea.** *Nyl.*—Thallus white, thin, unequal, subdispersed; apothecia black or livid-black, margined, often subplicate; spores 8 næ., ellipsoid, 0,013-16 mm. long, 0,006-8 mm. thick, epithecium glaucescent, hypothecium reddish; hymenial gelatine bluish, and then tawny wine-coloured with iodine. On sandstone rocks. Jersey (Larbalestier). Allied to *L. sublatypea*. Leight.

3. **Lecidea mesotropoides.** *Nyl.*—Thallus externally somewhat similar to that of *L. mesotropa*, but with the areolæ convex (K + (yellow), medulla I—); apothecia at first plane, margined, at length convex, prominent, immarginate, the lamina thinner than in *L. mesotropa*, and the spores shorter, 0,009-11 mm. long, 0,006-7 mm. thick; perithecium circumcinct. Spermatogones frequent, scattered over the areolæ, with spermatia 0,007-10 mm. long, scarcely 0,001 mm. thick. On calcareous stones of an old wall on Craig Tulloch, Blair Athole (August, 1871, Crombie).

4. **Lecidea subfurva.** *Nyl.*—Thallus brownish-black or greyish-brown, above minutely furfuraceous and opaque, areolato-diffract, indeterminate (K —); apothecia black, plane, ruguloso-opaque, margined, often angulose, obscure within; spores 8 næ., colourless, subgloboso-ellipsoid, simple, 0,011-12 mm. long, 0,009 mm. thick; paraphyses slender, irregular, indistinct; epithecium and hypothecium obscure; hymenial gelatine intensely blue with iodine. On micaceous stones of old walls in Glen Fender and on Craig Tulloch, Blair Athole (Crombie, August, 1870). Externally somewhat resembling *L. furvella*, but belonging to the section of *L. petrosa*.

5. **Lecidea confusula.** *Nyl.*—Thallus olive-grey, or bright brownish-grey, thinnish, granulated or granulato-conglomerated, the glomeruli dispersed; apothecia black, adnate, convex, immarginate, white within; spores 8 næ., ellipsoid, simple, somewhat small, 0,007-11 mm. long, 0,0040-45, mm. thick; epithecium yellowish-brown, paraphyses slender, indistinct (visible with K); hypothecium colourless. On micaceous stones of an old wall on Craig Tulloch, in Blair Athole (Crombie, August, 1871).

6. *Lecidea depaxcula*. *Nyl.*—Thallus greyish, thin, subareolate, dispersed, evanescent, hypothallus black, but little conspicuous; apothecia black, small, somewhat diffract, slightly prominent, subumbonate in the centre, concolorous within, the margin obtusely turgid and sometimes subrenate; spores 8 $\text{n}\alpha$, colourless, ellipsoid, simple, 0,009-12 mm. long, 0,005-7 mm. thick; epithecium obscurely bluish; paraphyses moderate, bluish-green towards the apex; hypothecium brownish-black; hymeneal gelatine intensely bluish or dark-blue with iodine. On calcareous stones amongst detritus, on the summit of Ben-y-gloe (Crombie, August, 1871).

7. *Lecidea atro-badia*. *Nyl.*—Thallus dull-brown or greyish-brown, thinnish, areolato-diffract, hypothallus black, radiating at the circumference (medulla I —); apothecia black, somewhat convex, immarginate, concolorous within; spores 8 $\text{n}\alpha$, brown or blackish, oblong, 1-septate, 0,021-30 mm. long, 0,010-14 mm. thick; epithecium violet-brown, with K faintly purple; paraphyses not very distinct; hypothecium brown; hymeneal gelatine intensely bluish with iodine. On quartzose rocks on the summit of Ben-y-gloe (Crombie, August, 1871). Allied to *L. badio-atra*.

8. *Verrucaria submicans*. *Nyl.*—Not unlike *V. punctiformis*, var. *tremula*, but with longer spores, 0,020-26 mm. long, 0,006 mm. broad. It is allied also to *V. elongatula*, but this species has the spores more fusiform. On the bark of hollies in the New Forest (April, 1868, Crombie).

9. *Verrucaria analeptella*. *Nyl.*—Similar to *V. epidermidis*, f. *analepta*, but with the paraphyses soft, distinct, though but slightly evolute. From *V. fallax* it is distinguished by the smaller apothecia, and different thecæ and spermatia. On the bark of trees in Ireland, frequent (Carroll). It appears in Anzi L. min. r. No. 395, s. n. *Sagedia ænea*.

10. *Verrucaria spilobola*. *Nyl.*—Thallus black, thin, evanescent; apothecia black, small, somewhat prominent, crowded or submarginali-aggregated, the perithecium entire, black; spores 8 $\text{n}\alpha$, colourless, oviform or oblongo-oviform, slightly 1-septate, 0,015-2 mm. long, 0,007-8 mm. thick; paraphyses none; hymeneal gelatine not tinged with iodine. On calcareous stones on Craig Tulloch (August, 1871, Crombie). This species has the green gonidia often 4 connate, and belongs to the section of *V. mesobola*.

SYNOPSIS OF NEW YORK UNCINULÆ; by Charles H. Peck, contains the following species:—*Uncinula circinata*, C. & P., on maple leaves; *Uncinula adunca*, Lev., on leaves of willow and poplar; *Uncinula macrospora*, Peck., on elm leaves (scarcely tenable); *Uncinula parvula*, C. & P., on leaves of *Celtis*; *Uncinula flexuosa*, Peck., on horse-chestnut leaves; *Uncinula Clintonii*, Peck., on leaves of Basswood, and *Uncinula ampelopsidis*, Peck., on leaves of woodbine.

THE NEW CONSPECTUS OF THE FAMILIES AND
 GENERA OF DIATOMACEÆ. By Professor H. L. SMITH,
 of Geneva College, New York.

The July part of the "Lens" contains the Index to the above Conspectus. It will be found that the Professor has applied the pruning knife most unsparingly, doubtless to the great disgust of the "species mongers." Some of the genera might, we think, have been retained with advantage; for example, the *Campylo-disci*, which has been relegated to the *Surirellæ*. This genus has two unvarying characteristics, viz., the circular form of the valves, and the median space of the two valves of the frustule are always at right angles to each other; consequently the valve must be truly circular. Professor W. Smith, the author of the Synopsis, has erred in placing *Campylodiscus spiralis* in that genus. Kutzing was right in making it a species of *Surirella* (*S. spiralis*).

The union of the genera *Triceratium* and *Amphitetras* with *Biddulphia* we think will not be generally accepted; to do so necessitates the enlargement of the generic characters of the last to too great an extent. The number of species will also be inconveniently large.*

The genus *Triceratium* might, we think, be united to *Amphitetras* without much alteration of the generic character. The author is, no doubt, right in abolishing the conditions of stipitate, tubular, &c., as being of no value. He remarks, "The conditions *frondose*, *stipitate*, *filamentous*, *tubular*, &c. I have not considered sufficient to warrant the formation of new genera. A long study of living forms has convinced me that these characters are fleeting—not to be relied on.

"Among the *Schizonemeæ*, *e. g.*, the fronds are quite variable which enclose the same siliceous frustules; and the fronds themselves vary with the habitat. The tubes of *Colletonema* and *Encyonema* disappear in quiet waters, and the frustules become embedded in amorphous jelly, or quite free."

The number of genera dealt with in the Conspectus, and which the Professor says "includes, as far as I am aware, either as admissible or among the synonyms, the name of every genus hitherto constituted," is 299; the number deleted is 189, thus abolishing nearly two-thirds!!!

We find on comparing the Conspectus with the Synopsis of British Diatomaceæ 23 out of the 59 genera described therein deleted.

The following list shews the genera retained, but in order to

* The author will no doubt complete the Synopsis by publishing a Conspectus of the Species of Diatomaceæ.

embrace all the species in the Synopsis, nine genera not included in that work are added :—

- | | |
|--------------------|--------------------|
| 1. Actinocyclus. | 20. Fragillaria. |
| 2. Amphipleura. | 21. Gomphonema. |
| 3. Amphora. | 22. Grammatophora. |
| 4. Amphiprora. | 23. Isthmia. |
| 5. Arachnoidiscus. | 24. Licmophora. |
| 6. Asterionella. | 25. Mastogloia. |
| 7. Achnanthes. | 26. Melosira. |
| 8. Biddulphia. | 27. Navicula. |
| 9. Cocconeis. | 28. Nitzschia. |
| 10. Coscinodiscus. | 29. Podocystis. |
| 11. Cyclotella. | 30. Pleurosigma. |
| 12. Cymatopleura. | 31. Rhabdonema. |
| 13. Cymbella. | 32. Stauroneis. |
| 14. Denticula. | 33. Surirella. |
| 15. Diatoma. | 34. Synedra. |
| 16. Epithemia. | 35. Striatella. |
| 17. Eunotia. | 36. Tabellaria. |
| 18. Eupodiscus. | 37. Tryblionella. |
| 19. Eucampia. | |

Additional genera to which some of the forms in the Synopsis are referred :—

38. Actinoptychus, *Ehr.* (*Actinocyclus undulatus*, *Sm.*)
39. Auliscus, *Ehr.* (*Eupodiscus sculptus*, *Sm.*)
40. Ceratoneis, *Kutz.* non *Ehr.* (Part of *Synedra* and *Eunotia*, *Sm.*)
41. Campyloneis, *Grunow.* (*Cocconeis Grevillii*, *Sm.*)
42. Ditylum, *Bailey.* (*Triceratium striolatum*? *Sm.*)
43. Diatomella, *Greville.* (*Grammatophora Balfouriana*, *Sm.*)
44. Gomphogramma.
45. Stictodesmis, *Greville.* (*Surirella Craticula.*)
46. Toxarium, *Bailey.* (*Synedra undulata*, *Sm.*)

Genera abolished in the new Synopsis. (The numbers refer to the genera to which the species belonging to the deleted genera are relegated.)

- | | |
|---------------------|--------------------|
| Achnanthidium. 7. | Homeocladia. 28. |
| Amphitetras. 8. | Meridion. 15. |
| Bacillaria. 28. | Odontidium. 15-20. |
| Berkeleya. 27. | Orthosira. 26. |
| Colletonema. 27-30. | Pinnularia. 27. |
| Campylodiscus. 33. | Podosphenia. 24. |
| Cocconema. 13. | Podosira. 26. |
| Doryphora. 27-29. | Rhiphidophora. 24. |
| Dickiea. 27. | Schizonema. 27-32. |
| Encyonema. 13. | Tetracyclus. 44. |
| Himantidium. 17. | Triceratium. 8-42. |

F. KITTON, *Norwich.*

CRYPTOGAMIC LITERATURE.

ON THE SPERMOGONIA AND PYCNIDIA OF CRUSTACEOUS LICHENS, by Dr. Lauder Lindsay, in "Linnean Transactions," xxvi., part 2.

KREMPELHUBER, Flechten aus Amboina, in "Abhand. der. K. K. Zool. Bot. Gess. zu Wien :—" Bde. xxi. (1871); descriptions reprinted in "Hedwigia," No. 8, 1872.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY,
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By THE REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 55.)

150. **Polyporus (Resupinati) vesiculosus.** *B. & C.*—Late effusus alutaceus; poris pezizæformibus veluti à vesiculis ruptis enatis. No. 4578. Alabama. Peters. On pine planks.

Widely spreading, pale tan-coloured; pores $\frac{1}{100}$ inch wide, looking like minute burst bladders.

151. **Polyporus (Resupinati) minimus.** *Ravenel.*—Pulvinatus fere totus e poris mollibus ceraceis candidis elongatis minimis constitutus; No. 2988. Car. Inf.

Only one or two lines across, forming little cushions, consisting almost entirely of very minute, elongated, wax-like pores.

152. **Polyporus (Resupinati) fatiscens.** *B. & Rav.*—*Rav.* Fung. Car. Fasc. 2, No. 21. Totus resupinatus albus tennissimus pulveraceus; poris seriis, enatis primum punctiformibus dein angulatis. Car. Inf. Entirely resupinate. At first consisting of a thin white pulverulent stratum, which, after a time, bears pores about $\frac{1}{100}$ inch wide, which are at first punctiform, then angular.

153. **Polyporus (Resupinati) tenerrimus.** *B. & Rav.*—*Rav.* Fung. Car. Fasc. 3, No. 13. Totus resupinatus, tenerrimus, fulvus, aquosus; poris minimis, dissepimentis tenuibus.

Entirely resupinate; very thin and tender, of a watery texture, tawny; pores very small, confluent, with very thin dissepiments. On bark of *Ulmus Americana*.

* **Glaeoporus conchoides.** *Mont.*—*Rav.* Fung. Car. Fasc. 1, 22. No. 2146, Car. Inf. Curt. (No. 196, 1337, *Ravenel*), who believes it to be a perfectly developed *Polyporus nigro-purpurascens*. *Schweinitz*.

* **Trametes Benzoina.** *Fr.*—No. 5824, New Eng. Sprague, on Pine. No. 3618. *Tram. Micheneri*, Penns. appears to be the same.

* **Trametes odorata.** *Fr.*—No. 5907. New Eng., Russell, on Pine.

* **Trametes Pini.** *Fr.*—No. 3226. *Car. Inf.* Curtis. Occurs also in Cuba.

* **Trametes rigida.** *B. & Mont.*—Syll. p. 168. *Pol. rigidus*, Rav. *Fung. Car. Fasc.* 1, No. 15. No. 999, 2921, 6170. *Car. Inf.* (No. 1454, Rav.) *Car. Inf.* on *Diospyros*. No. 5092. Alabama, Beaumont; New Orleans, Drummond. Like the following has a wide geographical range.

* **Trametes hydnoides.** *Fr.*—No. 3093. Texas, C. Wright.

* **Trametes occidentalis.** *Fr.*—Rav. *Fung. Car. Fasc.* 5. 18. No. 4864. Alabama, Beaumont.

154. **Trametes Lindheimeri.** *B. & C.*—Pileo dimidiato, applanato, fulvo, floccis mollibus, strigosis, spongioso-implicatis vestito; margine tenui; poris demum umbrinis mediis, dissepimentis dentato-elongatis. No. 3764, 3919. Texas, C. Wright.

Pileus 6 inches across; 3 long, pale, tawny, dimidiate, plane, clothed with soft, matted strigose hairs, which are quite distinct in young specimens, though always inclined to become fasciculate; margin thin; pores at length dingy-umber, $\frac{1}{35}$ inch across, slightly angular; dissepiments rigid, often elongated into one or more teeth. Allied to *T. ozonioides* and the Cuban *T. aculeifera*.

155. **Trametes Petersii.** *B. & C.*—Pileo applanato subtiliter tomentoso pallide fulvo marginem versus subsulcato-zonato, poris minimis punctiformibus, dissepimentis ab initio rigidis. No. 4558. Alabama, Peters.

Pileus flattened, but slightly convex, minutely tomentose; of a very pale tawny, somewhat sulcate or zoned at the margin, which is barren; pores quite punctiform, with rigid obtuse dissepiments about $\frac{1}{150}$ inch wide. Only a portion of a single specimen was sent, but the characters will be sufficient to recognise it.

156. **Trametes limitata.** *B. & C.*—Suborbicularis, applanata, pallida subtiliter tomentosa zonata; poris minimis concoloribus; dissepimentis tenuibus; margine sterili acuto, No. 6377. N. Mexico, Dr. Bigelow.

About an inch in diameter, thin, coriaceous, minutely tomentose, pallid zoned; pores about $\frac{1}{150}$ inch across, angular, with thin dissepiments; margin sterile, thin, about a line broad. At first sight bearing some resemblance to the last, but the pores are quite different, with thin dissepiments; when young, distinctly angular.

* **Trametes lactinea.** *B.*—Ann. Nat. Hist., v. 10, p. 373. No. 6199, New Eng., Murray. This species is found also in Cuba, Ceylon, &c.

157. **Trametes Ohiensis.** *B.*—Pileo pulvinato, angusto, zonato, ochroleuco, tomentoso, demum; laccato-glabrato contextu tenui subconcolore; hymenio concavo candido; poris punctiformibus; dissepimentis rigidis latis. Waynesville, Lea.

Pileus $\frac{3}{4}$ -1 inch wide, $\frac{1}{3}$ inch long; often laterally confluent pulvinate, decurrent behind, ochrey-white, zoned; at first tomentose, at

length smooth, as if laccate; hymenium white, concave; pores punctiform, $\frac{1}{100}$ in. wide, with broad, obtuse dissepiments. Allied to *Trametes ochroleuca*, B. In the measurement of the pores, the dissepiments are always included, so that $\frac{1}{100}$ means a hundred to the inch. This was formerly referred to *P. pubescens*, Fr.

* **Trametes sepium.** B.—Lond. Journ. Bot. v. 6, p. 322. *Dædalea Sepium*, Rav. Fung. Car. Fasc. 1, 21. Pilei effused at the base, reflexed, often laterally confluent, finely tomentose, repeatedly zoned, pale wood-coloured; coriaceous, sometimes triquetrous when young; substance white; hymenium pallid; pores slightly sinuated, about $\frac{1}{30}$ inch across. No. 166, 329. Car. Sup. No. 1029, 1473, 1541, 2063, 2284, 2303. Car. Inf. On oak, pine, Taxodium. No. 3874. Alabama, Peters. 3878, Alabama, Beaumont, on Laurus Sassafras. No. 5591, Connect., C. Wright. Ohio, Lea.

158. **Dædalea glaberrima.** B. & C.—Pileo reniformi candido, polito leviter sulcato; stipite laterali brevi obtuso; poris demum sinuosis. No. 1032. Santee River. On decaying logs.

Pileus $3\frac{1}{2}$ inches across, 2 long; reniform, rather rugged, with a few shallow grooves; white, polished; margin thin; stem $\frac{1}{2}$ inch long and wide, lateral, obtuse; pores $\frac{1}{40}$ inch wide, at length sinuated. This is just one of the species which oscillate between *Trametes* and *Dædalea*.

* **Dædalea pallido-fulva.** B.—Hook Lond. Journ., v. 6, p. 322. Of a corky substance; pileus $1\frac{1}{2}$ inches long, 3 or more across; dimidiate, rather shining, rugged, zoneless, pallid; hymenium pale tawny; pores narrow, $\frac{1}{80}$ inch wide, straight, here and there sinuated. Ohio, T. G. Lea.

* **Dædalea confragosa.** Fr.—No. 5862. Maine, Morse. Few fungi are more liable to be attacked by insects.

159. **Dædalea puberula.** B. & C.—Pileo molli-suberoso, irregulari, dimidiato, hic illic tuberculoso, puberulo, ochraceo; margine tenui; poris parvis demum sinuatis, No. 3612. Penns. Dr. Michener.

About 4 inches across; irregular, corky, of a soft substance, which is slightly zoned, attached behind, and more or less decurrent, even, with the exception of a few obtuse, tubercular, elevations, finely pubescent; ochraceous; pores about $\frac{1}{80}$ inch across, sinuated; of the same colour as the pileus. This species just forms the transition between the two sections of Fries.

* **Dædalea cinerea.** Fr.—No. 1865. Rhode Island, Bennett.

* **Dædalea unicolor.** Fr.—No. 3398. Masstt., on Willow. No. 4710. Car. Inf.

* **Dædalea aurea.** Fr.—Rav. Fung. Car. Fasc. 2. 14. (Rav. No. 1614. 1624.) Car. Inf. Ohio, Lea.

* **Dædalea ferruginea.** Fr.—No. 4273, 4407. Penns. Michener, on *Betula lenta*, Brit. N. Am. Franklin's First Voyage.

160. **Dædalea Ravenelii.** *B.*—Ferruginea, pileo postice decurrente, tomentosus, ætate spadiceo; poris irregularibus, primum pubescentibus. Rav. No. 1775. Car. Inf.

Ferruginous in the younger part, with sometimes a tawny tint. Pileus $\frac{1}{2}$ – $\frac{3}{4}$ inch across, scarcely $\frac{1}{4}$ inch long, decurrent behind, tomentose, becoming dark brown in the older parts; pores irregular, about $\frac{1}{8}$ inch across, at first pubescent.

* **Cyclomyces Greenii.** *B.*—Hook, Lond. Journ. iv., p. 306. Pileus orbicular, undulated, somewhat lobed, zoned, tomentose, cinnamon coloured, marked with a few lines towards the margin; stem central, obconical; gills at length somewhat ash-coloured. Massachusetts, Greene, Sprague. Pileus 1– $3\frac{1}{2}$ inches across.

* **Hexagona sericea.** *Fr.*—No. 696. Car. Inf. Rav. No. 3650. Louisiana, Dr. Hale. New Orleans, Drummond.

161. * **Hexagona carbonaria.** *B. & C.*—Tota resupinata, fulvo-fusca, margine nullo, subtus, fulva tomentosa; poris rigidis, dissepimentis acutis, no. 2466. Car. Inf. On charcoal and burnt sticks in woods.

Entirely resupinate, of a tawny brown, forming little, interrupted, rather convex patches; pores springing abruptly, without any margin, about $\frac{1}{36}$ of an inch across, but very variable in size; dissepiments acute. The under surface, when detached, is tawny and tomentose.

* **Hexagona variegata.** *B.*—No. 3133. Key West, Blodgett. The species was described from Jamaica, St. Domingo, and British Guiana specimens.

162. **Favolus Curtisii.** *B.*—Pileo orbiculari umbilicato tenuissimo, margine ciliato; stipite centrali deorsum incrassato setuloso; poris oblongis mediis. No. 335. Car. Sup. Curtis.

Pileus $\frac{3}{4}$ inch across, very thin, and transparent; margin irregular, ciliated; stem 1 inch high, $1\frac{1}{2}$ line thick at the base, about $\frac{3}{4}$ line at apex, hispid; pores oblong, about $\frac{1}{8}$ inch wide. Resembling *P. arcularius*, but much more delicate.

* **Favolus cucullatus.** *Mont.*—*F. curtipes*, B. & C. Kew Gard. Misc. i. p. 234. No. 1544. Santee River.

Specimens of *F. cucullatus* from St. Domingo exactly connect the South Carolina plant with that of Cuba. The pores are quite concealed in both on the upper side. *F. induratus*, from St. Domingo, has larger pores.

* **Merulius tremellosus.** *Schrad.*—Rav. Fung. Car. 3. 15. No. 2083. 2435. Car. Inf. Curtis. The only European species which is closely allied to *M. incarnatus*, Schwein. no. 2745, 1676. Car. Inf. Rav. Fung. Car. 2. 22.

* **Merulius corium.** *Fr.*—*M. confluens*, Rav. Fung. Car. 1. 23. No. 1030, 1123, 1363, 1386. Car. Inf. (Rav. no. 971.) No. 4470. Car. Sup. No. 5424. Maine, E. S. Morse. No. 5425. New Engl. Murray on *Vitis labrusca*.

It occurs also in tropical climates, as at Bombay.

163. **Merulius hædinus**. *B. & C.*—Rav. Fung. Car. 4. 8. Pileo dimidiato candido glaberrimo, hymenio ruguloso. No. 3812. Alabama. T. M. Peters.

Pileus 1 inch or more across, $\frac{1}{4}$ long, white, except at the margin, where it has a pale umber tint, quite smooth, slightly wrinkled; margin lobed, probably from the lateral confluence of one or more individuals; hymenium deep flesh-coloured, wrinkled.

* **Merulius aureus**, *Fr.*—Car. Inf. Ravenel.

164. **Merulius Wrightii**. *B.*—No. 3144. Texas. C. Wright. Pusillus reniformis extus furfuraceus, hymenio albido, poris radiantibus.

About $\frac{1}{4}$ inch long and wide, reniform, externally furfuraceous; hymenium dirty white, with a few radiating pores. A very curious species, apparently intermediate between *Laschia* and *Merulius*.

165. **Merulius ambiguus**. *B.*—*M. fugax*. Rav. Fung. Car. 1. 24. Orbicularis, margine demum reflexo sulcato villosio plicis radiantibus demum reticulatis. No. 1138, 1218. No. 2339. Car. Inf. On *Pinus palustris*.

Two to three inches across, orbicular, at length reflected on one side, villous and sulcate, white; hymenium red-brown when dry; folds radiating, and at length reticulate. This is clearly very different from authentic specimens of *M. fugax* from Fries, resembling in fact the *Fl. Danica* figure more than the plant of the great Swedish mycologist.

166. **Merulius Ravenelii**. *B.*—*M. serpens*, Rav. Fung. Car. 4. 9.—Orbicularis totus resupinatus, margine tomentoso albo; hymenio poroso ex alutaceo rufo demum spadiceo. No. 1770, 2965. Car. Inf. Curtis & Ravenel. (Rav. No. 658.)

Orbicular, 2 inches or more across, surrounded by a distinct, white, tomentose border; hymenium tan-coloured, then sienna brown, at last deep brown, with distinct, nearly regular pores. This again is very different from authentic specimens of *M. serpens* from Fries, to which it was originally referred.

* **Merulius Porinoides**. *Fr.*—No. 2615. Car. Inf. No. 5228. Alabama, Peters. On oak.

167. **Merulius ceracellus**. *B. & C.*—Totus resupinatus margine tenui; hymenio primum lævi ceraceo, dein reticulato-poroso alutaceo. No. 2802. Car. Inf. On oak.

Forming small, thin, resupinate patches with a thin white border; hymenium tan-coloured at first, quite even and waxy, at length distinctly porous. The first condition is exactly that of *M. serpens*, but the appearance is ultimately very different.

168. **Merulius bellus**. *B. & C.*—Effusus subbysssoideus irregularis; hymenio alutaceo poris ab initio distinctis brevibus. No. 6099. Alabama. Peters. On abies.

Effused, more or less byssoid; hymenium tan-coloured, dis-

tingtly porous as soon as the hymenium is formed. This is quite different from the last, though difficult of definition; the walls of the pores are not rigid as in *M. ceracellus*.

169. **Merulius patellæformis.** *B. & C.*—*Pusillus orbicularis* totus resupinatus fuscus; hymenio poroso. No. 6361. Car. Inf. On very rotten wood.

Scarcely exceeding a line in breadth, orbicular, entirely resupinate, brown, paler towards the margin; hymenium porous. Very minute, but quite distinct.

* **Merulius lacrymans.** *Fr.*—No. 2168. Car. Inf. A variety growing on the soil.

We have no specimen from N. America in the normal condition.

* **Merulius incrassatus.** *B. & C.*—Kew Gard. Misc. i. p. 234. No. 1504. Car. Inf. On pine stumps.

Effused for several inches, resupinate, with the margin shortly reflexed, dirty white, and slightly silky; substance thick, fleshy; folds forming minute shallow brownish pores. Allied to *Merulius tremellosus*, but thick and fleshy with minute pores.

* **Merulius brassicæfolius.** *Schwein.*—Rav. Fung. Car. 2. 23.

170. **Merulius spissus.** *B.*—*Poris primum pallidis brevibus dein fuscis elongatis e strato membranaceo oriundis.* Car. Inf. Curtis.

Resupinate several inches across, at first membranaceous with shallow pale pores about $\frac{1}{24}$ th of an inch in diameter, then much elongated and forming a dark brown mass.

* **Arrhytidia flava.** *B. & C.*—No. 1349. Car. Inf.

Forming little, scattered, sometimes confluent patches $\frac{1}{2}$ in. broad, consisting of a white mycelium which forms a distinct border to the smooth orange-yellow hymenium; sometimes the border is double. Spores oblong, fixed obliquely at the base.

171. **Arrhytidia fulva.** *B. & C.*—*Pusilla horizontalis, spathulata, fulva.* No. 4739. Car. Inf.

About $1\frac{1}{2}$ line long, horizontal, spathulate, abruptly narrowed behind into a short stem; hymenium like the pileus fulvous.

* **Porothelium fimbriatum.** *Fr.*—No. 2349. Car. Inf.

* **Porothelium lacerum.** *Fr.*—No. 2791. Car. Inf. On oak.

* **Porothelium Pezizoides.** *Schwein.*—No. 3851. Car. Inf. No. 6108. Alabama, Peters.

The papillæ in the latter specimen are elongated as in *Solenia*. On *Liriodendron*.

* **Porothelium subtile.** *Fr.*—No. 2393. Car. Inf. On oak.

* **Porothelium Friesii.** *Mont.*—No. 1792. Car. Sup. On *Juniperus Virginiana*.

172. **Porothelium hynoideum.** *B.*—*Effusum niveum pulverulentum, verrucis primum pruinosis, dein lutescentibus, demum fuscis.* No. 3686. Car. Inf.

Effused, snow-white, pulverulent looking at first exactly like

Hydnum farinaceum, but the pruinose setæ soon become yellowish above and at length brown.

173. **Fistulina pallida.** *B. & Rav.*—Pileo reniformi pallido-rubente, stipite laterali, tubis decurrentibus. Ravenel (No. 1486.) On the ground. Mountains of South Carolina. No. 6339. Alabama, Peters. Base of a stump of *Quercus alba*.

Pileus 1-2 inches across, about 1 inch long, uniform, pallid red, pulverulent; margin inflexed; stem lateral, $1\frac{1}{2}$ inch high, $\frac{1}{3}$ thick, striate when dry; tubes more or less decurrent.

174. **Fistulina spathulata.** *B. & C.*—Pileo tenui, spathulato in stipitem gracilem basi attenuatum cum tubulis decurrente. No. 6066. Alabama, Peters. At the base of an oak.

Pileus $\frac{3}{4}$ inch across, thin, pulverulent, spathulate, attenuated behind into the lateral stem; stem 2 inches or more high, $1\frac{1}{2}$ line thick above, much attenuated downwards. Apparently a very distinct species.

* **Fistulina hepatica.** *Bull.*—No. 3546. Penns., Michener.

* **Hydnum subsquamosum.** *Batsch.*—No. 1318. 1382. Car. Inf. (Rav. 1505).

* **Hydnum diffractum.** *B.*—Hook. Lond. Journ. 6, p. 323.

Pileus 3 inches across, convex, smooth, of a tough fleshy substance, at length much cracked and split; margin involute; stem $1\frac{1}{2}$ -2 inches high, $\frac{3}{4}$ thick, buff, and split like the pileus, tender when fresh; spines even, subulate, soft, entire, pale buff; smell vinous.

175. **Hydnum Curtisii.** *B.*—Fuligineo-fuscum; pileo orbiculari lævi; margine inflexo; stipite centrali sursum attenuato; aculeis elongatis acutis integris. No. 2809. Car. Inf.

Whole plant of a dingy brown; pileus $\frac{5}{4}$ inch across, even; margin inflexed; stem bulbous at the base, where it is nearly $\frac{1}{2}$ an inch thick, attenuated upwards; spines even, entire, elongated. Allied to *H. lævigatum*.

* **Hydnum infundibulum.** *Sv.*—Ohio, T. G. Lea. A noble species.

* **Hydnum repandum.** *L.*—No. 1849. Rhode Island, Olney. No. 2861. 2931. Car. Inf. No. 3104. New Engl. Oakes. var. *rufescens*.

* **Hydnum compactum.** *Fr.*—No. 1383. Car. Inf.

* **Hydnum aurantiacum.** *F. & S.*—No. 5357. New. Engl. Sprague.

* **Hydnum ferrugineum.** *Fr.*—Rav. Fung. Car. 3. 17. No. 620. Car. Sup. No. 1397. Car. Inf. (Rav. No. 809.)

* **Hydnum zonatum.** *Batsch.*—Rav. Fung. Car. 1. 25. No. 1316. Car. Inf.

* **Hydnum graveoleus.** *Delastre.*—Rav. Fung. Car. 3. 16. No. 1314. Car. Inf. (Rav. No. 1506). Car. Sup.

* **Hydnum adustum.** *Schw.*—No. 3465. New York, Sartwell. (Rav. No. 824.) Car. Inf. Ohio, T. G. Lea.

BRITISH FUNGI.

By M. C. COOKE. (Continued from p. 56.)

Agaricus (Tricholoma) pravus. *Lasch.* "Deformed Tricholoma."

Reddish brown, pileus somewhat fleshy, campanulate, then expanded, umbonate (slightly silky), stem stuffed, then hollow, floccose, attenuated downwards; gills adnexed with a tooth, eroded, powdered with white.—*Lasch. Lin. iv., No. 532. B. & Br. N. H. No. 1191. Fr. Ep. p. 42.*

In a stove. July. Kew.

Considered by Fries as a variety of *A. ionides*.

Agaricus (Tricholoma) cælatus. *Fr.* "Embossed Tricholoma."

Pileus somewhat fleshy, convex, umbilicate, flocculose, then rugose or cracked, becoming pale; stem stuffed with flocci, equal, smooth, tawny; gills sinuate, adnate, crowded, dingy white.—*Fr. Ep., p. 42. B. & Br., Ann. N. H., No. 1192. Br. Bath, Trans. 1870, p. 61.*

On the ground. April. Charmy Down.

Spores subglobose, $\cdot 0003 \times \cdot 00015$ in. Stem 1 in. high, at length fistulose, incrassated above, scarcely or slightly pruinose. Pileus scarcely 1 in. broad, brownish, then greyish-brown.

Agaricus (Tricholoma) sordidus. *Fr.* "Dingy Tricholoma."

Tough, pileus somewhat fleshy, campanulato-convex, then plane or depressed, subumbonate, smooth, hygrophaneous, margin at length slightly striate; stem stuffed, fibrilloso-striate, rather curved, thickened at the base; gills rounded, rather crowded, violaceous or dingy-white, at length sinuato-decurrent.—*Fr. S. M., i., p. 51. B. & Br., Ann. N. H., No. 1196. Fl. Dan. t. 1843, f. 2. Buxb. iv., t. 12, f. 1.*

On the ground, amongst dung. Sept.

Spores pale ferruginous, $\cdot 0003$ in.

Agaricus (Tricholoma) lividus. *Fr.* "Ashy Tricholoma."

Fragile, pileus rather fleshy, convex then plane, smooth, moist, umbo evanescent; margin flattened, membranaceous, slightly striate; stem stuffed, then hollow and compressed, equal, floccoso-pruinose; gills truncate, free, soft, rather distant, greyish.—*Fr. Ep., p. 54. B. & Br., Ann. N. H., No. 1197.*

In pine woods. Nov. Ascot.

Agaricus (Tricholoma) putidus. *Fr.* "Stinking Tricholoma."

Pileus somewhat fleshy, hemispherical, umbonate, even, soft, hygrophaneous; stem hollow, fragile, sub-compressed, pruinose; gills adnexed, ventricose, crowded, cinereous.—*Fr. Ep. p. 54. B. & Br., Ann. N. H., No. 1198.*

In fir woods. Nov.

Stem $1\frac{1}{2}$ in. high, 3 lines thick, wholly fibrous, soft and fragile; pileus olive-grey, hoary when dry, here and there glistening. Gills 2-3 lines broad, distinct. Odour mealy, rancid.

Agaricus (Tricholoma) resplendens. *Fr.* "Shining Tricholoma."

White, pileus fleshy, convexo-plane, smooth, glutinous, with a

silvery lustre ; stem solid, stout, smooth, or flocculose at the apex ; gills free, then uncinatè adnexed, somewhat distant, unspotted.—*Fries Summ. Veg. Scan. p. 274.*

In shady places. Reading.

Stem sometimes equal, sometimes bulbous, $\frac{1}{2}$ in. thick. Pileus 3 in. broad.

Agaricus [(Clitocybe) nigrescens. *Lasch.* "Blackish Clitocybe."

Whitish ; pileus thin, soft, at first convex, obtuse, then plane, sub-umbonate, and somewhat depressed ; stem solid, tomentose ; gills thin, decurrent, very much crowded, narrow.—*Lasch. Linn., Vol. iv., No. 521. B. & Br., Ann. N. H., No. 1199.*

In larch plantations. W. G. S.

Pileus 2-3 in. broad ; stem $1\frac{1}{4}$ - $1\frac{1}{2}$ in. long, 2-3 lin. thick. Odour rather sweet, taste unpleasant.

Agaricus (Clitocybe) tornatus. *Fr.* "Regular Clitocybe."

White. Pileus fleshy, thin, orbicular, plane, sub-depressed, smooth, shining ; stem stuffed, equal, smooth, somewhat striated ; gills decurrent, adnate, rather crowded, plane.—*Fr. S. M. i. p. 91. Fr. Ep. p. 62. B. & Br., N. H., No. 1200.*

Amongst grass at the foot of old decayed elm stumps. Oct. Leicestershire.

Small, very regular, inodorous, stem slender, firm, pubescent at the base. Disk of pileus darker.

Agaricus (Clitocybe) orbatus. *Fr.* "Grey-gilled Clitocybe."

Pileus submembranaceous, umbilicate, then infundibuliform, smooth, hygrophanous ; margin at length striate ; stem hollow, equal, tough, smooth, cinereous brown ; gills decurrent, distant, at first dark-grey, then frosted with white.—*Fr. Ep. p. 74. Bull. t. 248, f. c. B. & Br., Ann. N. H., No. 1200.* Buxb. iv., t. 3, f. 1.*

In pine woods. Nov. Ely.

Pileus blackish-brown.

Agaricus [(Clitocybe) membranaceus. *Fr.* "Membranaceous Clitocybe."

Pileus infundibuliform, brick red, even, membranaceous ; stem fistulose, naked, attenuated upwards ; gills decurrent, pallid.—*Fr., El. p. 13. Fl. Dan., t. 1012. Fr. Ep. p. 68. B. & Br., Ann. N. H., No. 1201.*

In pine woods. Street, Somerset.

Fries, in his *Epicrisis*, regards this as a form of *Ag. infundibuliformis*.

Agaricus (Clitocybe) parilis. *Fr.* "Flocculose Clitocybe."

Pileus somewhat fleshy, convexo-plane, atomate, flocculose ; disc depressed ; margin deflexed, involute ; stem stuffed, fibrous, tough, rather firm, naked, dingy ; gills deeply decurrent, crowded, narrow, grey becoming whitish.—*Fr. S. M. i. p. 168. Pers. M.E. t. 26, f. 7. Fr. Ep. p. 69. B. & Br. Ann. N.H., No. 1202.*

By the side of plantations. Coed. Coch.

Slightly hygrophanous, but not becoming white.

Agaricus (Collybia) distortus. *Fr.* "Distorted Collybia."

Pileus fleshy, convex, then expanded, obtusely umbonate, smooth, even, growing pallid; stem somewhat hollow, ventricose, tomentose, attenuated, somewhat twisted, sulcate, pallid; gills slightly adnexed, subserrate, narrow, very much crowded; white, then spotted with reddish-brown.—*Fr. Ep. p. 84. B. & Br., Ann. N. H., No. 1205.*

At the roots of trees. Oct. Bowood.

Agaricus (Collybia) coracinus. *Fr.* "Rancid Collybia."

Strong smelling. Pileus rather fleshy, convex, then expanded, rather irregular, even, naked, hygrophanous; stem hollow, rigid, not rooting, subcompressed, squamulose with a white meal above; gills adnexed, seceding, scarcely crowded, rather broad, whitish-grey.—*Fr. Ep. p. 95. B. & Br., Ann. N. H. No. 1207.*

In fir plantations. Nov. Batheaston.

Pileus fuscous then grey, not silky, $1\frac{1}{2}$ in. and more broad; stem tough, $1\frac{1}{2}$ in. high, 4 lines thick.

Agaricus (Collybia) murinus. *Batsch.* "Brown Collybia."

Pileus rather fleshy, campanulato-convex, then expanded, umbilicate, smooth, then somewhat squamulose or rugulose, growing pale; stem hollow, cylindrical, not rooting; gills slightly adnexed, broad, rather distant, dirty white, becoming pallid.—*Batsch. f. 19. B. & Br. Ann. N. H. No. 1210. Fr. Obs. 2. p. 115. Fr. El. p. 97.*

On the ground in woods. Marlborough Forest. Oct.

Pileus brownish, becoming pale.

Agaricus (Collybia) clusilis. *Fr.* "Closing Collybia."

Pileus submembranaceous, hemispherical, expanded, umbilicate, smooth, hygrophanous; margin rounded, inflexed, slightly striate; stem stuffed with flocci, then hollow, smooth, flexile, not rooting; gills subarcuate, affixed, broad, semicircular, plane, white, growing pallid.—*Fr. Ep., 98. B. & Br., Ann. N. H., 1211. Bull, t. 411, f. 2.*

Var. β . **Minor.** Amongst Hypnum. Coed Coch. Oct., 1869. Stem $1\frac{1}{2}$ -2 in. high, 1 line thick; pileus $\frac{1}{2}$ -1 in. broad.

Agaricus (Mycena) cohærens. *A. & S.* "Velvety Mycena."

Pileus rather fleshy, campanulate, then expanded, obsoletely umbonate, velvety, cinnamon-brown, growing pale; stem horny, very rigid, even, smooth, shining, bay, pallid above; gills free, distant, connected by slight veins, white, then yellowish, growing pallid.—*A. & S. p. 163. B. & Br., Ann. N. H., No. 1212. Fr. Ep., p. 105.*

On bramble. Feb. Batheaston.

Agaricus (Mycena) atro-cyaneus. *Batsch.* "Dark-blue Mycena."

Fragile, inodorous; pileus membranaceous, campanulate, then convex, sulcate, covered with an evanescent white powder; umbo irregular, obtuse; stem straight, filiform, dark-blue, base villose, somewhat bulbous, gills attenuated, adnexed, lanceolate, distant, whitish.—*Batsch., f. 87. B. & Br., Ann. N. H. No. 1213. Fr. Ep. 109.*

On the ground. Nov. Ascot.

Pileus 3-5 lines broad, brownish, then grey, becoming bluish.

WEISSIA TRUNCICOLA=DICRANUM MONTANUM.—Observing that you have re-printed my description of *Weissia truncicola* De Not., I beg now to correct the same by informing you that the species is a nonentity. Having shown the specimen to Prof. Lindberg, during his recent visit, he informed me that he was under the impression that Juratzka had referred it to *Dicranum montanum* Hedwig, and on comparing the two, I find that they are truly identical. The species is, however, none the less an addition to our Flora, and one that ought to occur here, since it is found throughout Europe, though most frequent in pine forests; its place will be next to *D. strictum*.—R. BRAITHWAITE.

NEW BRITISH LICHEN, LECIDEA FOSSARUM.—Thallus tenuissimus, obscurus vel evanescens, apothecia late croceo-rufa, planiuscula, adpressa, immarginata mediocria, thecæ polysporæ. Sporæ oblongæ vel oblongo-cylindricæ. Description furnished in letter from the Revd. W. A. Leighton, Shrewsbury, of date March, 4th, 1869. The above Lichen was gathered in a Cryptogamic trip with Dr. James Stirton, Glasgow, in the month of July, 1868, on Ben Lawers, near the head of the ravine where the saxifages are usually got. Unfortunately all the specimens gathered got quite broken, except the one which was forwarded to Mr. Leighton, and from which he sent the above description.—WALTER GALT, *Glasgow*.

FUNGUS SHOW AT SOUTH KENSINGTON.—Amongst the exhibits were a beautiful specimen of *Thelephora multizonata* from Epping; a species of *Hydnum* new to Britain, several specimens of *Sparassis crispa*—a peculiar form of *Cantharellus* allied to *Cantharellus cibarius* from Reading, besides some other very interesting fungi. Messrs. B. J. Austin of Reading, English of Epping, and W. G. Smith exhibited good collections.

LUMINOSITY IN FUNGI.—A striking example is recorded by the Rev. M. J. Berkeley, in "Gardeners' Chronicle" for Sept. 21. A log of Spruce or Larch, 24 feet long, had the inside of its bark covered with a white byssoid mycelium. This was so luminous that when wrapped in five folds of paper the light penetrated through all the folds on either side as brightly as if the specimen was exposed. "Observers as we have been of Fungi in their native haunts, for fifty years," adds the writer, "it has never fallen to our lot to witness a similar case before." From the observations it seems probable that putrescence had as much to do with the luminosity as the mycelium. We regret that our space will not permit us to reprint this communication or the remarks of Mr. W. G. Smith in the succeeding number of the same journal.

NOVARA DIATOMS.

Descriptions of New Genera and Species of Diatoms obtained by the Austrian Imperial Frigate Novara, during her Voyage round the World.

By HERR A. GRUNOW.

(Translated by F. KITTON.)

PART II.

Schizonema reptabundum, *Grun.*—Frond minute, tubes minute, thin, creeping on various Algæ, naviculæ generally in simple series, frustule broad at the ends, centre slightly attenuated, valve narrow, rhomboido-lanceolate, apices somewhat obtuse, central nodule large, round, strito-punctate, delicate, 60 in. $\cdot 001$, slightly radiant, more conspicuous near the centre. Pl. v, fig. 1, a portion of a tubule, with the frustules included, *b c* valves.

Upon *Calithamnium Borreri*, from the coast of Madeira, Jelinek ; from Dalmatia, Dr. Lorenz.

This small, but characteristic species, has been long known to me as frequently occurring on *C. Borreri*, obtained from various localities.

The valves bear boiling in nitric acid very well.

Striatella chilensis, *Grun.*—Minute frustules, quadrate, longer or shorter than broad, septæ (dissepimentis) imperfect, more or less numerous, arcuate; valves broad, linear, apices rounded, sides slightly orbicular, striæ delicate, parallel, 50-55 in. $\cdot 001$; median line distinct in the large valves, obsolete in the small valves. Pl. i, fig. 2, *a* and *d* valves, *b* narrow frustule, *c* broad frustule.

Upon Algæ, from Valparaiso.

Approaches my *S. kamtschatica* very nearly, but differs from it in its smaller form, delicate striæ, and especially by its constantly arcuate septæ, which are many times repeated and cut through, and overlie the conspicuously convex central line, something after the manner I have figured my *Euodia Frauenfeldii*.

Fragillaria (?) Nankoozenis, *Grun.*—Valves linear, lanceolate, constricted below the apices, which are round, subcapitate, and produced; median line and terminal nodules distinct, striæ transverse, not punctate, 17 in. $\cdot 001$, absent from the centre and below the apices. Pl. v, fig. 3.

Very rare in the "Polycystin stone," from Nankoori.

Of the form of *Denticula fulva*, Greg, but differs materially in the strong costæ-like non-punctate striæ, which are interrupted by a narrow smooth space at the centre. It also resembles *F. amphiceros*, but Ehrenberg has not figured his form with the central smooth space.

Plagiogramma stipitatum, *Grunow.*—A variety distinguished by the peculiarity of the central costæ, which are frequently inter-

rupted by an elliptical ring similar to a form figured by Greville as *P. elongatum*, and which does not reach the margin of the valve. Pl. v. fig. 4 a. b.

***P. constrictum* var. ? *Nankooorensis*, Grun.**—Valve broad, deeply constricted, central space annular. Pl. v. fig. 9.

The transformation of the two central costæ of *Plagiogramma* into enclosed elliptical and round rings clearly indicates the necessity of uniting *Glyphodesmis* with *Plagiogramma*.

Our form is distinguished from *P. constrictum* by the form of the terminal smooth spaces which are longly elliptical, whilst in Greville's figure the lower part of the nodule has a flat base.

(I am unable to agree with the author's remarks that *Plagiogramma* and *Glyphodesmis* should be united; the latter genus has a distinct central nodule, in *Plagiogramma* this is wanting.—F. K.)

***Denticula nicobarica*, Grun.**—Small, valves narrow, linear, sometimes linear lanceolate, rounded at the apex, costæ 12 to 14 in. .001, striæ granular, 24 to 28 in. .001. Pl. v. fig. 6, a. valve, b. frustule. Not uncommon in the "Polycystin stone" from Nankoori.

A characteristic species with conspicuous moniliform striæ between the costæ, and occasionally with interrupted or imperfect costæ.

(This form seems to me to be identical with the *Eunotia Sancti-Antonii* of Ehrenberg's mikrogeologie and the *Denticula Lauta* of Bailey in Smithsonian Contributions. A very common form in the Californian deposits.—F. K.)

***Rhaphoneis Rhombus*, Ehr. var. *dubia*, Grun.**—Valve broad, ovato-lanceolate; apices slightly produced, somewhat obtuse; median line narrow in the central part, slightly dilated; central nodule obsolete, sometimes slightly visible; striæ punctate, radiant, 24 in. .001; punctæ minute, confluent. Pl. v. fig. 7.

***Synedra Nitzschoides*, Grun.**—Small variety; valve marked on both sides with cuneate, marginal puncta, 30 to 32 in. .001. Pl. v. fig. 8. a. b. c. d.

On Algæ from Valparaiso.

Many of the valves are slightly cuneiform, and resemble the more delicate and short wedge-shaped frustules of *Meridion marinum*, Greg., which I found in detached frustules in shore sand from Auckland, and which I at one time took to be a *Sceptroneis*.

(I am unable to detect any resemblance to the genus *Nitzschia*, at least as that genus is usually understood. Judging from Grunow's figures I should refer this form to *Denticula*, possibly a variety of *D. mutabile*.—F. K.)

***Nitzschia panduriformis*, Greg. Var. ? *Nicobarica*. Grun.**—Valves large, irregularly granulate; granules minute; transverse striæ delicate; longitudinal striæ obsolete; oblique none; puncta on keel large. Pl. v. fig. 5.

In sea sand from the island of Kamortha.

Larger than *N. panduriformis*, but of similar shape; the structure, however, differs, whilst the irregular, closely packed puncta show no symptoms of oblique arrangement, but very delicate transverse lines, whilst the longitudinal lines are not resolvable. This form would, perhaps, better be considered a variety of *N. plana*, Sin., to which it bears resemblance. I have only had the opportunity of examining two valves. To this genus, perhaps, belongs also the *N. panduriformis* of Hantzsch in "Rabenhorst-Beiträgen," Part I. Pl. vi. fig. 7. There also no oblique striæ can be detected. *N. bilobata*, Sm., has a similar outline to this form, on account of its central keel, and although not observed by Smith, its central nodule, like *Amphiprora latestriata*, Breb., should be placed with the *Amphiprora* or some *Amphiprora*-like genus which possess punctate keels.

(The author was no doubt misled, like De Brebisson, by Smith's erroneous figure, which represents *N. bilobata* with distinct striæ. The *Amphiprora latestriata* of De Brebisson, from whom I received authentic specimens, is *Navicula convexa*, Sm.!! The present species can hardly be a variety of *N. panduriformis*, Greg., the arrangement of the striæ in that being totally different, viz., in regular lines and their oblique direction being very distinct.—F. K.)

Euphyllodium spatulatum, Shadbolt.—Many characteristic forms occur in the Polycystin stone from Nankoori, showing distinctly the costæ between the quadratic puncta. On the narrow base the costæ are bifid, nevertheless I believe the species now before me, although not absolutely identical with Shadbolt's form, must be placed with Podocystis. Pl. i. fig. 10 is a valve from Nankoori enlarged to 500 diameter.

(It is to be regretted that the author did not figure a normal instead of an abnormal form. My specimens have both margins alike, as in other species of Podocystis.—F. K.)

Orthonais? Barbadensis, Grun.—*Cocconeis*, Greville in Mic. Jour. xii. Pl. ii. f. 10.

Var. nankoorensis, Grun. Small, elliptical. Pl. v. fig. 13.

In Polycystin stone, Nankoori, very rare. The valves are much smaller and narrower than in the type form, and the puncta nearest the median line form curved lines, which in Greville's figure are straight. The structure, however, closely enough resembles the type species.

Mastogloia Jelinekiana, Grun.—*Navicula Jelinekiana*, Pl. v. fig. 12.

I have recently found this form in tolerable plenty among diatomaceæ collected by Lindig at Honduras, and find in many examples the marginal oblong plates (platten) which appear to be the analogues of the marginal plates of *Orthonais fimbriata*. But on account of the lanceolate form of the valves and generally produced apices I cannot well place this form in the genus *Orthonais*.

In the meanwhile I place it in *Mastogloia*, which must therefore

be divided into two sections, the one containing forms with marginal loculi, the other those surrounded with marginal plates.

Amphora kamorthensis, *Grun.*—Frustules complex, oblong, subrectangular, or with a slight median constriction; angles rounded; valves linear cymbiforme; ventral margin straight; dorsal elevated in the central part, straight, or slightly constricted; apices slightly produced; median line somewhat bi-undulate, approaching the inferior margin; central nodule transverse, dilated; longitudinal sulcus parallel with the dorsal portion; striæ punctate, subradiant, 35 in. $\cdot 001$. Pl. v. fig. 11. a. b. c. d.

Not uncommon in shore sand from Kamortha, one of the Nicobar Islands.

I have formerly described the form as *A. Grevilleana*. Further observations on better preparations, in which valvular views were abundant, show that the distinct, broad, median line is constant. I have occasionally observed valves greatly resembling *A. Grevilleana*.

Navicula fortis = *Pinnularia fortis*, Gregory.

Var. ? opima.—Frustules broad, truncate, slightly constricted at the centre; valves broad, ovato-lanceolate, rounded at the apices; median line straight, central nodule small, oblong; terminal nodules minute, remote from the ends, striæ conspicuous, non-punctate, subradiant, 14 to 15 in. $\cdot 001$; a smooth space surrounds the central nodule. Pl. v. fig. 13. a b.

Amongst sand from the roots of *Ecklonia*, from St. Paul, and rare in shore sand from Auckland.

Among all the figures known to me, the best is one of *N. varians* in Mic. Jour. iii, pl. 2. fig. 25. *N. varians* is, however, entirely confined to freshwater. *N. retusa*, Breb., appears to be closely related to this form; but the valves are smaller, and not so broad as in *N. fortis*.

Navicula quadrisulcata, *Grun.*—Valves broad, ovato-lanceolate, ends slightly produced, obtuse, central nodule small, oblong, striæ transverse, distinct, minutely punctate, radiant, 16 to 20 in. $\cdot 001$; furrows longitudinal, connivent at the ends, double on each side. Pl. v. fig. 14 a b.

Amongst sand, from the roots of *Ecklonia buccinalis*, from St. Paul's, South Sea. A characteristic form that cannot be confounded with any other species. It is distinguished from *N. nitescens* not only in form and its conspicuously punctate striæ, but also in the greater number of longitudinal furrows.

Navicula suborbicularis var. nankoorensis, *Grun.*—Costæ distinct, 10 in. $\cdot 001$, alternating with a series of minute granules. Pl. v. fig. 16.

In Polycystin stone, from Nankoori.

The form, median line, and longitudinal furrow same as in the type species; the delicate rows of puncta stand between strong costæ, which in that form are delicate and scarcely visible. In

Hedwigea, I have described a second form of this species from Honduras, which differs essentially from *N. Smithii*, and which have only costæ and not series of puncta.

(Query.—Would this form be identical with Greville's *Cocconeis cælata*, Mic. Jour. vol. x. pl. x. figs. 5. 6.)

DESCRIPTION OF PLATE V.

- Fig. 1.—*Schizonema reptabundum*; a portion of frond, b and c navicula $\times 400$.
 Fig. 2.—*Striatella chilensis*; a valve, b c and d frustules.
 Fig. 3.—*Fragillaria nankooensis*.
 Fig. 4.—*Plagiogramma stipitatum*; a and b valves.
 Fig. 5.—*Nitzschia panduriformis* var. (?) *nicobarica* $\times 400$.
 Fig. 6.—*Denticula nicobarica*; a valve, b frustule.
 Fig. 7.—*Rhaphoneis rhombus* var. *dubia*.
 Fig. 8.—*Synedra nitzschoides* var. *minuta*; a b and c valves, d frustule.
 Fig. 9.—*Plagiogramma constrictum* var. *nankooense*.
 Fig. 10.—*Euphyllodium spathulatum*.
 Fig. 11.—*Orthoneis barbadensis* var. *nankooense* $\times 400$.
 Fig. 12.—*Mastogloia Jelinekiana*.
 Fig. 13.—*Amphora kamorthensis*; a and b valves, c and d frustules.
 Fig. 14.—*Navicula fortis* var. *opima*; a valve, b frustule.
 Fig. 15.— „ *quadrisulcata*; a and b valves.
 Fig. 16.— „ *suborbicularis* var. *nankooensis*.

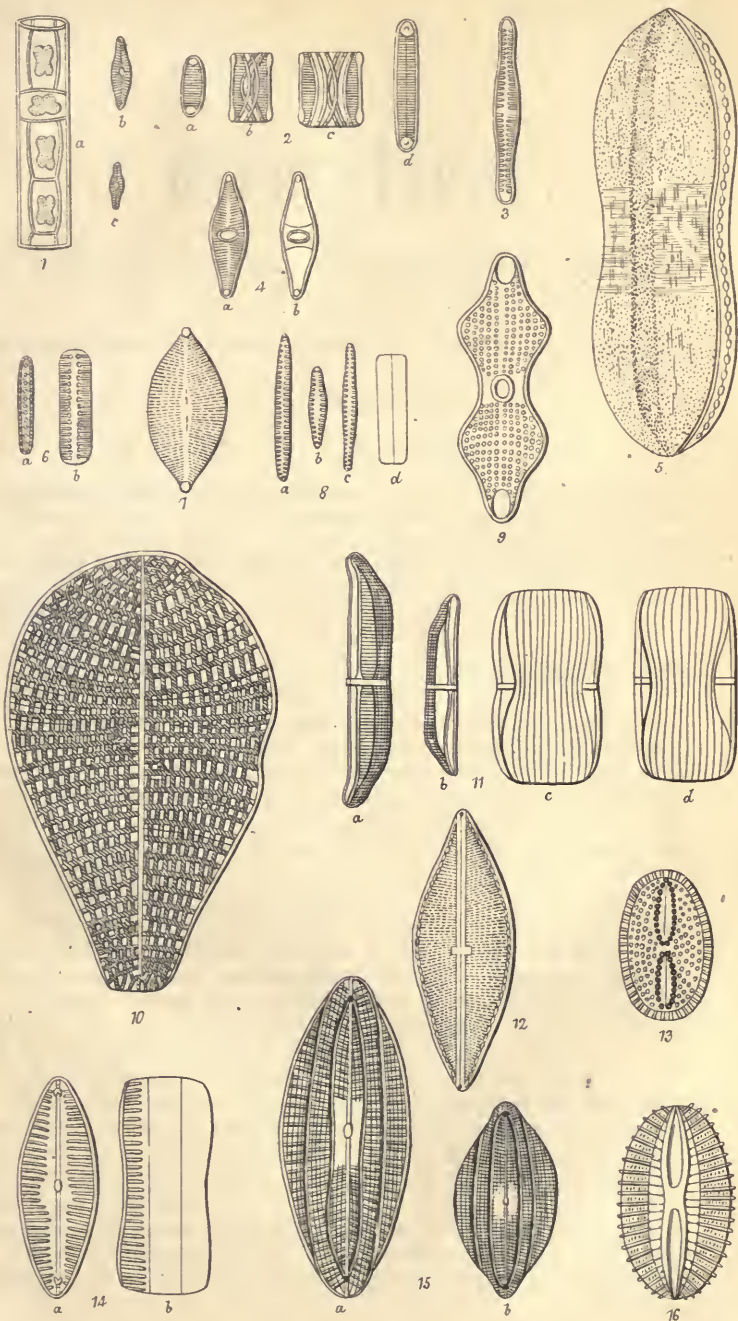
All the figures, with the exception of 1, 5, and 11, are magnified 500 diameters.

CRYPTOGAMIC LITERATURE.

BOTANISKA NOTISER ut gifne af O. Nordstedt oet A. Falck. (Lund.) The "Botanical Notices," originally and for some years published in Upsal, are now published at Lund, in a new and entirely remodelled form, by Otto Nordstedt, who is both Editor and Publisher since the lamented death of his colleague, Mr. A. Falck. Nearly all of the papers are in Swedish. The following is a list of those relating to Cryptogamic Botany which have been published during the last year:—

N. J. Scheutz; Sketch of the Moss Flora of Smaaland: Vert Wittrock; Dispositio *Ædogoniacearum suecicarum*: J. Agardh; On the Algæ collected during the "Josephine" Expedition: Hy. Mosén; Contributions to the Moss Flora of Sweden: Norstedt and Wahlstedt; List of the Scandinavian Characeæ. Sophia Akermarck; List of dried specimens of Scandinavian Algæ. Wittrock; *Ædogoniaceæ Novæ in Suecia lectæ*. Norman; Fuligines lichenosæ or Moriolei. Areschong; On a Collection of Algæ from Alexandria. Lundell; De Desmidiaceis quæ in Suecia inventæ sunt, Observationes Criticæ. Norman; Cives novi lichenacæ articæ Norwegiæ. S. Berggren; Bryological Sketches of the Norwegian Coast. N. Wulfsberg; New Norwegian Mosses. In addition to translated and reproduced papers, the former being almost entirely limited to the writings of German botanists, Canon Kingsley's address on "Biology" being the only English contribution so honoured. The Journal is published six times in the year, each issue consisting of two sheets, and costing for the year about 3s. 5d.

R. B.



Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY,
AND ITS LITERATURE.

BRITISH FUNGI.

By M. C. COOKE. (Continued from p. 74.)

Agaricus (Mycena) ammoniacus. *Fr.* "Strong-scented Mycena."

Strong scented; pileus membranaceous, conical, then expanded, umbonate, naked, discoid, opaque; paler at the margin and striate; stem rather firm, even, smooth, dry, rooting; gills adnate, linear, distinct, whitish.—*Fr. Ep. p.* 109. *Fr. Obs. ii., p.* 155. *B. & Br. N. H. No.* 1214.

On the ground. Oct. Lyndhurst.

Pileus normally brown or blackish, sometimes cinereous; stem not yellowish, 2 in. long, $\frac{1}{2}$ line thick.

Agaricus (Mycena) peltatus. *Fr.* "Peltate Mycena."

Pileus rather firm, convex, then plane, obtuse, densely striate to the middle, disc somewhat fleshy orbicular, even, plane; stem even, smooth, villous below; gills with a decurrent tooth, crowded, ventricose, grey, with the edge paler.—*Fr. S. M. i. p.* 145. *Fr. Epic. p.* 110. *Br. Bath Trans.* 1870, p. 64. *Ag. ambustus, Secr., No.* 927.

Amongst moss. Warleigh Down.

Inodorous. Pileus $\frac{3}{4}$ in. broad, dark brown when moist, when dry becoming somewhat depressed at the centre, and paler.

Agaricus (Mycena) sacchariferus. *B. & Br.* "Sparkling Mycena."

Whitish. Pileus hemispherical, stem short, filiform; gills few, rather thick, sprinkled with shining granules.—*B. & Br., Ann. N. H., No.* 1216. *Br. Bath Trans.* 1870, p. 64.

On bramble and nettle stalks. March. Batheaston.

Pileus 2 lines broad; stem 2 lines high, fixed at the base by a few flocci; gills 8-9, very distant, arcuato-decurrent, their margin and even the surface granulated. Allied to *A. tenerrinus*, which has crystalline particles on the pileus, but the gills are free and ventricose. *B. & Br.*

Agaricus (Omphalia) leucophyllus. *Fr.* "White-gilled Omphalia."

Pileus submembranaceous, infundibuliform, becoming even, not floccose, dark cinereous, margin reflexed, involute; stem stuffed,

then fistulose, rather rigid, equal, even, smooth, cinereous; gills decurrent, rather distant, arcuate, distinct, whitish.—*Fr. in Vet. Ac. Förh.* 1851. *Fr. Mon. Hym. i. p.* 183. *B. & Br. Ann. N. H. No.* 1217.

Amongst short grass. Coed Coch.

Stem $1\frac{1}{2}$ inch and more long, 1 line thick. Pileus about an inch across.

Agaricus (Omphalia) rusticus. *Pers.* "Rustic Omphalia."

Pileus membranaceous, slightly convex, umbilicate, striate, smooth, hygrophanous, when dry smooth and silky; stem somewhat stuffed, slender, smooth, greyish brown; gills decurrent, thick, rather distant, equally attenuated towards each extremity, grey, margin arcuate.—*Pers. Obs. i. t. 4, f.* 12. *B. & Br. Ann. N. H. No.* 1217, *bis.* *Fr. Ep. p.* 124.

On the ground. Sept. Coed Coch.

Agaricus (Pleurotus) mutilus. *Fr.* "Mutilated Pleurotus."

White, soft, pileus rather fleshy, versiform, when dry silky, becoming smooth; stem excentric, short, and sublateral, terete, erect, villous at the base; gills decurrent, narrow, rather thick, and somewhat crowded.—*Fr. S. M. i. p.* 191. *B. & Br. Ann. N. H. No.* 1221. *Fr. Epicr. p.* 134. *Batt. t. ix. E.*

On dead wood. Dec.

Agaricus (Volvaria) medius. *Fr.* "Intermediate Volvaria."

White, pileus fleshy, convexo-plane, obtuse, viscid, of one colour; margin even; stem solid, equal, smooth; volva lobed.—*Fr. Epicr. p.* 139. *Fl. Dan. t.* 1676. *Br. Bath. Trans.* 1870, *p.* 65.

In woods, &c. Warleigh Down.

Agaricus (Clitopilus) vilis. *Fr.* "Paltry Clitopilus."

Pileus rather membranaceous, convex, umbilicate, somewhat striate with silky flocci, soft, hygrophanous; stem hollow, thin, equal, fibrilloso-striate, grey; gills adnate, decurrent, crowded, whitish or greyish.—*Fr. Epicr. p.* 150. *Br. Bath. Trans. p.* 66.

In pine woods, amongst moss. Leigh Woods.

Stem 2-3 in high, about 1 line thick. Pileus about an inch broad.

Agaricus (Leptonia) lappula. *Fr.* "Bur-like Leptonia."

Pileus rather fleshy, convexo-plane, the darker umbilicus punctate with short erect fibrils; stem fistulose, slightly striate, lilac with a brown tint, apex naked, punctate with black; gills adnate, seceding, ovate, crowded, whitish.—*Fr. Ep. p.* 152. *B. & Br. Ann. N. H. No.* 1225.

Amongst leaves of beech. Forres.

Agaricus (Leptonia) solstitialis. *Fr.* "Solstitial Leptonia."

Pileus rather fleshy, depressed, papillate in the centre, rugulose, obsolete clad with innate fibrils; stem somewhat hollow, smooth, smoky; gills emarginate, broad, whitish.—*Fr. Ep. p.* 152. *B. & Br. Ann. N. H. No.* 1226.

Amongst stones by the side of Lake Ceneord, Aberdeenshire. Sept.

Agaricus (Leptonia) lazulinus. *Fr.* "Bright-blue Leptonia."

Pileus submembranaceous, campanulate, then expanded, obtuse, discoid, at first even, striate when moist; stem fistulose, smooth, nearly of a cœrulean blue; gills adnate, crowded, equally attenuated, pale bluish.—*Fr. Ep. p.* 143. *B. & Br. Ann. N. H. No.* 1227. *Pers. Ic. Pict. t.* 4. *f.* 3, 4.

On the ground amongst grass. Sept. Aber.

Agaricus (Nolanea) mammosus. *Fr.* "Mammose Nolanea."

Pileus somewhat membranaceous, conico-campanulate, papillate, striate, smooth, hygrophaneous; when dry isabelline and silky; stem fistulose, rigid, polished, even, smooth, mealy at the apex; gills affixed, seceding, rather crowded, grey.—*Fr. Epicr. p.* 156. *Bull. t.* 526. *Br. Bath. Trans.* 1870, *p.* 66. *Batsch. f.* 5.

In meadows. Chippenham.

Pileus brown. Stem elongated, fragile, shining.

Agaricus (Nolanea) verecundus. *Fr.* "Modest Nolanea."

Pileus campanulate, then convex; disc fleshy, smooth, somewhat umbonate, about the thin margin striate and flocculose; stem fistulose, rather firm, growing pale, mealy at the apex; gills adnate, whitish.—*Fr. Spic. p.* 6. *Fr. Ep. p.* 158. *B. & Br. Ann. N. H. No.* 1228.

Amongst short grass. Sept. Aber.

Agaricus (Stropharia) inunctus. *Fr.* "Anointed Stropharia."

Pileus campanulate, then convexo-plane, covered with an evanescent gelatinous cuticle; stem attenuated downwards, white, flocoso-fibrillose below the ring; gills broad, adnate, purplish-brown.—*B. & Br. Ann. No.* 1229.

On rich ground. Ely, &c.

Pileus 2 in. across, fleshy, livid; stem $2\frac{1}{2}$ in. high, $\frac{1}{4}$ in. thick, stuffed, composed of fibres; spores purplish-brown, .00028 in. long. Resembles some states of *A. æruginosus*, but the spores are of a different colour and much smaller.—*B. & Br.*

Agaricus (Pholiota) confragosus. *Fr.* "Rugged Pholiota."

Pileus fleshy, thin, convexo-plane, obtuse, clad with flocculose scales, hygrophaneous; margin striate; stem fistulose, equal, fibrillose below the membranaceous ring; gills adnate, very much crowded, rufous.—*Fr. Ep. p.* 169. *B. & Br. Ann. N. H. No.* 1232.

On an old fallen elm. Coed Coch.

Stem 3 in. long, about 2 lines thick. Subcœspitose, fragile. Spores oblong, ferruginous (.0003 \times .00015 in.)

Agaricus (Hebeloma) phæjocephalus. *Bull.* "Bullard's Hebeloma."

Pileus subcampanulate, rarely flattened and umbonate, fuliginous, becoming brownish, smooth; stem thick, swollen at the base, naked, straight, grey with brownish lines, white at the base; gills free, semilunate, very broad, yellowish bistre colour.—*Bull. t.* 555. *f.* 1. *B. & Br. N. H. No.* 1233.

Oct. Near Wellington.

Pileus 2-4 in. broad; stem 3-5 in. high, 4-7 lines thick. The spores are bright ferruginous red.

Agaricus (Hebeloma) calamistratus. *Fr.* "Crispate Hebeloma."

Pileus fleshy, thin, campanulate, obtuse, stem solid, rigid, base sky-blue, squarrose everywhere with rigid recurved scales; gills adnexed, whitish, then ferruginous.—*Fr. S. M. i. p.* 256. *B. & Br. Ann. N. H. No.* 1234. *Fr. Epicr. p.* 171.

In fir woods. Sept. Luggala, Wicklow.

A noble species, remarkable for the blue colour of the base of the stem. Spores .0005 in. long, smooth.

AGARICUS (HEBELOMA) GEOPHYLLUS. *Sow.* Var. **LATERITIUS.** —*B. & Br. Ann. N. H. No.* 1234.*

This curious form, if it is really the same species, has been sent to us by Mr. Jerdon from Jedburgh. When dry it retains its brick-red colour. *B. & Br.*

Agaricus (Hebeloma) scabellus. *Fr.* "Ragged-cap Hebeloma."

Pileus rather fleshy, campanulate, then plane, when dry lacerated into scales or fibrils, umbo obtuse, even, smooth; stem somewhat stuffed, thin, smooth, growing pale, pruinose at the apex; gills adnexed, ventricose, rather distant, pallid.—*Fr. Epicr. p.* 177. *Fr. S. M. i. p.* 259. *B. & Br. Ann. N. H. No.* 1235.

Amongst short grass. Oct. Little Ormes Head.

Pileus chestnut, sericeo-squamulose; stem white, pruinose at the apex; gills ventricose, adnexed, ascending, pallid.

Agaricus (Hebeloma) firmus. *Pers.* "Firm Hebeloma."

Pileus viscid, gibbous, smooth; stem not attenuated, brown downwards and within; gills thin, slightly sinuated behind, cinnamon brown.—*Pers. Ic. & descr. t.* 5, f. 3, 4. *B. & Br. Ann. N. H. No.* 1236. *A. clavus, Batsch. f.* 199.

In fir woods. Sept. Gwrwch, Denbighshire.

Taste not bitter, smell raphanoid. Colour exactly as in Batsch's figure.

Agaricus (Hebeloma) elatus. *Batsch.* "Elevated Hebeloma."

Pileus fleshy, convexo-plane, obtuse, even, smooth, rather viscid; stem stuffed, elongated, cylindrical, twisted, adpressedly fibrillose, apex farinaceous, growing pale; gills rounded, crowded, dry, pale ferruginous.—*Batsch. f.* 108. *B. & Br. Ann. N. H. No.* 1238. *Fr. Epicr. p.* 181.

Amongst pine leaves.

Odour very strong; stem 4 in. long, 4 lines thick. Pileus orbicular, 3 in. broad, tan colour, margin thin; gills 3 lines broad, unspotted.

Agaricus (Hebeloma) Hongardii. *Weinm.* "Bongard's Hebeloma."

Pileus rather fleshy, campanulate, obtuse, disc squamose, torn and fibrillose about the margin; stem solid, rigid, pale rubescent, reddish silky below, apex sprinkled with a whitish powder; gills adnate, ventricose, broad, pale reddish, then cinnamon.—*Weinm. p.* 190. *Fr. Epicr. p.* 173.

On sandhills. Forres. (J. K.)

With the odour of Bergamot. Stem 2-3 in. long, 2 lines thick.

Pileus 1-1½ in. broad, fuscous when moist, pallid when dry, not rimose.

Agaricus (Hebeloma) lanuginosus. *Bull.* "Woolly Hebeloma."

Pileus rather fleshy, hemispherical, then expanded, obtuse, flocoso-squamulose, the scales of the disc erect and squarrose; stem solid, thin, squamose, fibrillose, with a whitish powder above; gills seceding, thin, denticulate, pallid clay colour.—*Bull. t.* 370. *Br. Bath. Trans.* 1870. *p.* 67. *Fr. Epicr. p.* 171.

On the ground. Near Bristol.

Agaricus (Hebeloma) uniformis. *P.* "Uniform Hebeloma."

Pileus rather fleshy, convex, umbonate, piloso-squamose, stem somewhat hollow, fibrillose and squamulose, farinaceous at the apex; gills arcuate, affixed, ventricose, pallid olivaceous.—*Pers. Icon. Pict. t.* 15. *f.* 1. *Br. Bath Trans.* 1870. 67. *A. dulcamarus. Fr. Epicr. p.* 171.

In fir plantations. Bathford.

Agaricus (Flammula) mixtus. *Fr.* "Mixed Flammula."

Pileus fleshy, convex, then plane, obtuse, viscid; disc darker, rugulose; stem hollow, curved, pallid, with brownish fibrils, and rufous scales below; gills subdecurrent, crowded, pale clay colour.—*Fr. Ep. p.* 185. *B. & Br. Ann. N. H. No.* 1239. *bis.*

On the ground in pine woods. (C. E. B.)

Stem 1-3 in. long, 3-4 lines thick, somewhat flexuous, incrassated at the base. Pileus 1-2 in. broad, margin paler.

Agaricus (Flammula) alnicola. *Fr.* "Alder stem Flammula."

Pileus fleshy, convexo-plane, moist, even; from the first rather fibrillose or squamose, sometimes smooth; stem somewhat hollow, attenuated and rooting, fibrillose, yellow, becoming ferruginous; gills sub-adnate, broad, pallid, then ferruginous.—*Fr. S. M. i. p.* 250. *Fr. Epicr. p.* 187. *B. & Br. Ann. No.* 1242.

On stumps of various trees. Epping.

Agaricus (Flammula) conissans. *Fr.* "Tan-coloured Flammula."

Pileus fleshy, thin, convex, then plane, equal, smooth when moist; stem hollow, silky-fibrillose, pallid; gills adnate, thin, very much crowded, dingy pallid, becoming clay-coloured.—*Fr. Ep. p.* 187. *Bull. t.* 178. *B. & Br. Ann. N. H. No.* 1243.

On dead stumps.

Often confounded with *A. fascicularis*, but with differently coloured gills and spores. Pileus yellowish-tan, rather viscid.

Agaricus (Flammula) lubricus. *Fr.* "Slippery Flammula."

Pileus fleshy, convex, then plane, even, viscid; stem solid, rather attenuated, fibrillose, whitish, apex striate; gills adnate, broad, pallid, then clay-coloured.—*Fr. S. M. i. p.* 252. *Fr. Epicr. p.* 185. *B. & Br. Ann. N. H. no.* 1245.

On trunks. Tunbridge Wells.

Agaricus (Naucoria) semiflexus. *B. & Br.* "Half-turned Naucoria."

Pileus hemispherical, chestnut colour, hygrophaneous, margin fringed with a delicate white veil; flesh white; stem semi-hori-

zontal, solid; gills distant, adnexed, brownish; spores echinulate.—*B. & Br. Ann. N. H. No. 1246.*

On the side of a bank. Oct. Ascot.

Pileus $\frac{1}{2}$ in. across, subcampanulate, then hemispherical, or flattened above, moderately fleshy; stem $\frac{3}{4}$ in. high, $\frac{3}{8}$ line thick; spores oblong, .0003-.0004 long, .00025-.0003 in. wide. Allied to *A. horizontalis*. *B. & Br.*

Agaricus (Naucoria) scolecinus. *Fr.* "Rusty Naucoria."

Pileus rather fleshy, campanulate, then convex or plane, smooth, margin slightly striate; stem fistulose, equal, ferruginous, or rufous-ferruginous, sprinkled with white meal; gills adnate, rather distant, pale flesh colour, then ferruginous, edge flocculose.—*Fr. Ep. p. 194. B. & Br. Ann. N. H. No. 1247.*

On moist ground under alders. Sept. Powerscourt.

Spores apiculate, .0003 in. long, .0013 in. wide; stem 2-3 in. long, 1 line thick; pileus $\frac{1}{2}$ - $\frac{3}{4}$ in. broad, ferruginous bay, paler at the margin.

Agaricus (Naucoria) tenax. *Fr.* "Tough Naucoria."

Pileus somewhat fleshy, campanulate, then expanded, smooth, slightly viscid, hygrophanous, stem stuffed, then hollow, equal, yellow, brownish, slightly striate with adpressed fibrils; veil fugacious; gills adnate, rather distant, edge whitish.—*Fr. S. M. i. p. 290. Weinm. p. 262. Fr. Epicr. p. 198. B. & Br. Ann. N. H. No. 1248.*

On sticks in a ditch. Oct. Welford, Norths.

Pileus cinnamon, ochraceous when dry; stem becoming ferruginous or olivaceous; gills pallid, olivaceous, becoming ferruginous.

Agaricus (Naucoria) crobulus. *Fr.* "Scaly Naucoria."

Pileus rather fleshy, convexo-plane, obtuse, with whitish evanescent floccose scales, then smooth; stem fistulose, brown, with whitish scales, gills adnate, decurrent, crowded, ferruginous, brown.—*Fr. S. M. i. p. 200. Fr. Epicr. p. 200. B. & Br. Ann. N. H. No. 1249.*

In a ditch amongst fragments of sticks. Oct. Welford, Norths.

Pileus slightly viscid, scarcely striate, when dry tan-coloured, rather shining.

Agaricus (Galera) rubiginosus. *Pers.* "Rubiginous Galera."

Pileus membranaceous, campanulate, obtuse, everywhere sulcate or striate, hygrophanous; stem filiform; equal, thin, shining, smooth, rubiginous; gills adnate, ascending, distant, broad, opaque.—*Pers. syn. p. 385. B. & Br. Ann. N. H. No. 1252. Fr. Epicr. 206. Mich. Gen. t. 75. f. 8.*

Amongst moss. Sept. Kew.

Pileus cinnamon or honey-coloured, tan colour when dry; stem 2 in. long, flexile.

Agaricus (Psalliota) merdarius. *Fr.* "Dung Psalliota."

Pileus convexo-plane, obtuse, smooth, moist, hygrophanous; stem hollow, tough, short, flocculose when dry, and pallid; ring

lacerated, fugacious; gills adnate, broad, yellowish, then umber.—*Fr. S. M. i. p. 291. B. & Br. Ann. No. 1255. Fr. Epicr. p. 220. Weinm. p. 253. Buxb. C. 4. t. 16. f. 2.*

On dung. Oct. Sibbertoft.

Densely gregarious. Pileus moist, prettily edged with the remains of the veil, $\frac{1}{2}$ -1 in. across; stem $\frac{1}{2}$ - $\frac{1}{3}$ in. high.—*B. & Br.*

Agaricus (Hypholoma) leucotephrus. *B. & Br.* "White-capped Hypholoma."

Cæspitose. Pileus at first pallid, subcampanulate, rugose, then convex, expanded, whitish; stem silky-fibrillose below, apex striate, or between sulcate and striate, fistulose; ring broad, here and there appendiculate; gills narrow, at first cinereous-white, slightly adnate, then grey, nearly black.—*B. & Br. Ann. N. H. No. 1256.*

In large masses at the base of ash trees. Oct. North Kilworth.

Pileus 3 in. across; stem 4 in. high, 5 lines thick; gills $1\frac{1}{2}$ line broad; spores .00028 in. long .00019 in. wide, very dark brown purple. Clearly different from *A. Candollianus* and *A. appendiculatus*, *Fr.* The pileus is not of a rich brown when young, nor are the gills when old at all brown.—*B. & Br.*

Agaricus (Psilocybe) agnarius *Fr.* "Whitish Psilocybe."

Pileus conical-convex, then expanded, whitish, then becoming cinereous, not hygrophanous, subumbonate, between sulcate and striate; flesh white; stem flexuous, fistulose, white; gills rather distant, somewhat broad, briefly adnate or adnexed, cinereous.—*Fr. MSS. B. & Br. Ann. N. H. No. 1257.*

About the roots of decayed trees. Oct. North Kilworth, Leicestershire.

Allied to *A. coprophilus*. In colour the pileus somewhat resembles *Hygrophorus ovinus*.

Agaricus (Panæolus) acuminatus. *Fr.* "Acuminate Panæolus."

Pileus rather fleshy, conic, acuminate, even, smooth, shining, zoned about the margin with a blackish line; stem thin, equal, pruinose, bicolored; gills adnexed, ventricose, crowded, becoming blackish. *Fr. Epicr. p. 237. Batt. t. 22. F. B. & Br. Ann. N. H. No. 1258.*

On dung. Oct. Sibbertoft.

Exactly accords with Batarra's figure, which scarcely agrees with the specific name. *B. & Br.*

Agaricus (Psathyrella) subatratus. *Batsch.* "Blackish Psathyrella."

Pileus rather membranaceous, campanulate, then expanded, umbonate, striate, rugulose, sprinkled with pruinose atoms; stem straight, rather firm, shining with a silky lustre, naked; gills adnexed, fuliginous, becoming black.—*Batsch. f. 89. B. & Br. Ann. N. H. No. 1260. Fr. Epicr. p. 238.*

In grassy places. Sept. Batheaston.

Pileus rufescent, growing pale, scarce exceeding 1 in. broad. Stem $1\frac{1}{2}$ line thick, clad with whitish down at the base.

Agaricus (Psathyrella) caudatus. Fr. "Caudate Psathyrella."

Pileus membranaceous, conico-campanulate, striate, hygrophanous, even when dry; stem elongated, somewhat attenuated from the rooting base, at length twisted; gills adnate, cinereous, becoming black.—Fr. Obs. ii. p. 187. Fr. Ep. p. 239. B. & Br. Ann. N.H. No. 1261, Paul. t. 124. f. 1. 2.

Amongst the stumps of a wooden pavement. Sept. Sibbertoft.

A small form. Pileus at first sienna brown, at length whitish, often transversely cracked; stem at first white, fibrillose; gills ventricose, adnate. B. & Br.

Agaricus (Psathyrella) empyreumaticus. B. & Br. "Empyreumatic Psathyrella."

Pileus expanded, hygrophanous, sprinkled with atoms, rufous, growing pale; stem elongated, between silky and scurfy, pallid, narrowly fistulose; gills broad, thick, distant, adnate with a decurrent tooth, rufous, with a pallid edge.—B. & Br. Ann. N.H. No. 1262.

On a wooden pavement. Oct. Sibbertoft.

Pileus $1\frac{1}{2}$ in. across, margin crenate; stem $2\frac{1}{2}$ in. high, $1\frac{1}{2}$ line thick, narrowly but distinctly fistulose; gills 2 lines broad, connected by veins, rufous, then brown-purple; spores black. Resembling *A. confragosus* so closely that, till the spores were observed, it was taken for that species.—B. & Br.

ON THREE NEW SPECIES OF AGARICUS FROM A STOVE.

By THE REV. M. J. BERKELEY, M.A., F.L.S.

It is pretty certain that most of the Hymenomycetous fungi which occur in stoves are of exotic origin. *A. cepæstipes* and an allied similarly coloured species, which are the produce of our hot-houses, occur naturally in hot countries, and have never been found wild in Europe, and the same may be said of some others. The three species at present described appear to be quite new, and one of them is amongst the most interesting of the genus.

1. **Agaricus (Collybia) Dorotheæ.** B.

Pileo primum subgloboso fusco, dein applanato subumbonato pallidiore, demum depresso usque ad centrum radiato-sulcato granulato, setulis brevibus candidis sparso; margine crenato; stipite basi fibrilloso luteo vel rufo, sursum candicante velut pileus granuloso-hispidulo setuloso; lamellis candidis distantibus adnexis leviter ventricosis postice connexis, acie integra.

On a dead fern stem from Jamaica, in a hothouse at Dangstein. Lady Dorothy Nevill.

Pileus at first globose, dark brown, then flatly hemispherical, at

length expanded, with a slight umbo, and eventually depressed, pale brown, an inch or more across, radiated, sulcate from the crenate margin almost to the centre, granulated, beset with short white bristles, which in the young state point in every direction. Stem 2-2½ inches high, scarcely a line thick, at first brownish above, white below, with a minute disc-like swelling at the base, then yellowish or rufous below and white above, granulated like the pileus, and beset with white bristles. Gills white, distant, adnexed, slightly ventricose, connected behind; edge quite entire.

2. *A. (Collybia) caldarii*. B.

Pileo hemispherico umbonato brunneo rugoso non expallente; stipite brunneolo læri extus cartilagineo; lamellis adnato-decurrentibus subcinereis, interstitiis marginem versus venosis.

On Sphagnum, in an orchid pot at Dangstein.

Pileus hemispherical, umbonate, brown, rugose, not turning pale; ½ an inch across; stem paler, even, cartilaginous externally; 2 inches high, not a line thick; gills adnato-decurrent, somewhat ash-colored, interstices near the margin veined.

3. *A. (Omphalia) Nevillæ*. B.

Pileo hemispherico brunneo depresso rugoso striato minute granulato; margine tenuissimo, pallescente impunctato; stipite pallidiores nigro-granulato albo-farcto, basi subdilatato villosulo-strigoso; lamellis candidis arcuato-decurrentibus, interstitiis lateribusque venoso-rugosis.

On Sphagnum, in an orchid pot at Dangstein.

Pileus ½ an inch across, brown, hemispherical, depressed in the centre, rugose, minutely granulated, striate, growing pale, when parting with its moisture, towards the margin, which is not dotted like the centre; stem 1 inch high, not a line thick, brownish, stuffed, white within, rough with black granules, rather dilated at the base, and clothed with villous hairs; gills white, arcuato-decurrent; interstices and sides venoso-rugose.

Somewhat resembling *A. affricatus*, but not infundibuliform nor variegated with pilose scales, while the gills are white, not cinereous.

PROFESSOR H. L. SMITH'S CONSPECTUS.—I have just received a communication from my friend the author, calling my attention to one or two errors in my notice of his work. He says—"I did not intend to place all the Triceratiæ among the Biddulphiæ, for a large number of them belong among the Coscinodisceæ. . . . It is true this does not appear clearly in the Conspectus as it now stands, but this was my idea."*

Tetracyclus, Ralfs. should have been referred to *Biblarium*, Ehr.
F. KITTON.

* Professor Smith informs me that an addenda will shortly be published.

BLIGHTS ON TEA AND COTTON.

By M. C. COOKE.

The tea-planters of Cachar have been complaining of late that the leaves of the tea plants have become blighted, so as to interfere seriously with the production of tea. Two or three of the diseased leaves have been sent us for examination. They were not in good condition for the purpose, but on one we detected some punctures of an insect, and on two of the others a parasitic fungus. The leaves are blistered, deformed, and stunted; the fungus appearing on both surfaces like minute black points. The following is a description drawn up from the dry specimens:—

Hendersonia theæcola. *sp. nov.*—Perithecia globose, black, prominent, pierced at the apex, scattered over both surfaces, or subgregarious; spores cylindrical, rounded at the ends, triseptate, pale brown, on long hyaline pedicels (·0004–·0005 in.), 01–0125 m.m. long, without the pedicels.

On leaves of *Thea*. Cachar, India.

The ultimate cells have sometimes a more hyaline appearance, but we could detect no terminal cilia, otherwise it reminds us of such species of *Pestalozzia* as *P. Guepini*, which occurs on *Camellia* leaves. The only remedy we can suggest is to pick off the diseased leaves and burn them. What portion of the destruction is also due to the insect we have no material for determination, but both are probably culpable.

From Dharwar we have also received samples of “Black blight” on naturalised American Cotton. The cotton presents but little external indication of disease so long as the seeds remain entire, but, on crushing the seed the cotton becomes covered with a sooty powder, which at first we were disposed to regard as the spores of a species of *Ustilago*, which entirely fills the seed. After a closer examination, however, we became satisfied that the spores are concatenate, being produced in chains, or jointed threads, in the interior of the seed, and afterwards break up into subglobose spores. This is rather an anomalous habitat for a *Torula*, but such, nevertheless, we are disposed to regard it, and append its description.

Torula incarcerationata. *sp. nov.*—Produced within the seeds of *Gossypium*. Threads simple, or slightly branched, breaking up into minute, subglobose, fuliginous spores.

Within cotton seed. Dharwar, India.

It is rather to be presumed that the *Torula* makes its appearance after the commencement of decay in the seed, stimulated by moisture, than that it should be the cause of disease in the plant. The species of *Torula* with which we are acquainted are produced upon decaying substances, and we have no experience of any one causing disease in living plants. Had this proved to have been a species of *Ustilago*, the case would have been different, but we believe that, notwithstanding its habitat, we are justified in placing it with *Torula*.

NOVARA DIATOMS.

Descriptions of New Genera and Species of Diatoms obtained by the Austrian Imperial Frigate Novara, during her Voyage round the World.

By HERR A. GRUNOW.

(Translated by F. KITTON.)

PART III.

Navicula gemmata. *Greville* var. **biseriata.** *Grun.*—Striæ transverse, 10 in. .001 composed of a double series of minute granules. Pl. 6, fig. 1.

Polycystin Stone. Nankoori.

A very interesting form, perhaps a distinct species. The striæ consisting of two rows of closely-pressed, somewhat irregular shaped granules. The central nodule is large, square, and as in *Greville's* figure tridentate on both sides.

The smooth space between the striæ and the costæ on each side of the median line is less than in the type form, and the outline of the valve more symmetrical.

To this species perhaps belongs my *N. spectabilis*, in *Verh Wiener zool bot. Gesell*, 1860, pl. 3, fig. 11, and which was changed by *Rabenhorst* to *N. Grunowii*, on account of the *N. spectabilis* of *Gregory*.

Entopyla ornata. *Grun.*—Frustule large, valve linear, apices rounded, median line not reaching the apices, costæ pervious (not alternate) parallel, 10-12 in. .001, striæ distinctly granular, in pairs between the costæ. Pl. 6, fig. 2, *a* valve, *b* apex of a larger valve.

Not uncommon on Polycystin stone from Nankoori.

Differs from *Gephyria incurvata* in the costæ, which do not, as in that species alternate, but cross the valve. In *G. incurvata* we find a great number of minute puncta between the costæ.

Coscinodiscus ellipticus. *Grun.*—Valve elliptical or oblong, puncta in central part large, subradiant or irregularly disposed, decreasing as they approach the margin, where they form minute radiant striæ. Pl. 6, fig. 4, *a b*.

Very abundant. Polycystin stone, from Nankoori.

Has a remarkable resemblance to *Cestodiscus ovalis*, *Grev.*, but I can in no instance find a trace of the round processes or nodule.

Coscinodiscus oblongus. *Grev.*—Has radiating puncta, and the puncta on the margin are only a little smaller, whereas our species has a marginal band of very delicate and closely arranged puncta.

Amphipleura Frauenfeldii. *Grun.*—Central nodules $\times 1500$ diameters. Pl. 6, fig. 3.

Pleurosigma validum. *Shadbolt.*—*Mic. Jour.*, vol. ii., pl. 1., fig. 8.

Var. (?) nicobaricum. *Grun.*—Valve broadly lanceolate, somewhat obtuse, median line straight, central nodule dilated towards the margin, striæ transverse and oblique, transverse striæ distinct, 40 to 44 in. $\cdot 001$ The striæ become more oblique as they approach the ends. Pl. 6, fig. 5 *a. b.* portion of an abnormal valve more enlarged. In Polycystin stone, Nankoori.

This species has a resemblance to my *P. giganteum*, but is smaller, shorter, and less obtuse at the apices; the transverse are somewhat stronger than the oblique striæ, which, towards the ends, become somewhat more oblique.

In one specimen I detected from one to two rows of puncta, enclosed between delicate, often interrupted costæ, as I have sketched in fig. 5, *b.*

(*P. validum* is identical with *P. rigidum* of the Synopsis, and the preceding is only a straight form of the same. I have it from several localities.* The statement that this and many other diatoms have two sets of striæ (rows of punctæ) is erroneous; those said to have transverse and oblique striæ have them arranged thus:

$\cdot \cdot \cdot \cdot$ if the space between the transverse rows is greater
 $\cdot \cdot \cdot \cdot$ than that between the oblique, then the so-called trans-
 $\cdot \cdot \cdot \cdot$ verse striæ are more easily resolved, if, on the contrary, the space is greater between the oblique rows, then they are more easily detected. The same applies to the so-called transverse and longitudinal striæ. In this case, the puncta are arranged in the following manner:

$\cdot \cdot \cdot \cdot$ * F. K.)
 $\cdot \cdot \cdot \cdot$
 $\cdot \cdot \cdot \cdot$

Isthmia nervosa. *Var. (?) Nankooensis.* *Grun.*—Frustule somewhat flatter than in *I. nervosa*; between the costæ are one, two (or more) rows of square reticulations, rounded at the angles, which become smaller in size, and greater in number as they approach the margin of the valve. The connecting zone in *I. nervosa* is connected with the valve by a row of large cells. In this form they are wanting.

Pl. 6, fig. 6, *b.* portion of valve and connecting zone enlarged to 500 diameters.

Perhaps a distinct species; it differs from *I. nervosa* in the form of the reticulations; in the latter they are circular or five and six sided.

Asteromphalus Nankooensis. *Grun.*—Broadly ovate or sub-orbicular, centre hyaline, orbicular, slightly excentric; rays binate, forked, distinct, narrow; margin divided by two broad rays, reaching the circumference; space between the rays about $\frac{2}{7}$ of the valve, a single thin ray not reaching the margin divides this into two unequal parts. The inferior portion of the valve has five narrow short rays, of which the first and fifth are longest. Spaces marked with decussating punctate striæ. Pl. 6, fig. 9.

Not uncommon on Polycystin stone. Nankoori.

This appears to be a very constant species, it bears the most resemblance to *A. Malleus*, Wallich, but differs in many respects from that species. A peculiar characteristic of our species are the short rays on the inferior punctate portion of the valve, and the two broad rays reaching the superior margin. All examples we have observed are very constant in form.

Stictodiscus californicus. *Grev. Var. nankooxensis. Grun.*—Costæ radiant, generally bifid as they approach the margin, irregularly reticulate in the centre.

Pl. 6, fig. 8, *a. b.* part of a larger valve. Polycystin stone. Nankoori. Somewhat rare.

As in Dr. Greville's species a row of large granules lies between the costæ; the costæ divide as they approach the margin, so that more rows of puncta will be found near the circumference than near the centre. The irregularly disposed puncta of the middle portion are placed in a kind of network, from which apparently the marginal costæ proceed; this may also be seen in the Californian species.

Climacodium Fraunfeldianum. *Grun.*—Frustules scarcely silicious, smooth, expanded at the ends, truncate, forming long filaments. Pl. 6, fig. 10.

In the sea by Tilanshong, floating in masses.

A wholly distinct genus, with very weak siliceous frustules, which perhaps remotely approach *Eucampia Zodiacus*, one of the specimens consisted of 16 frustules, the frustules were $\cdot 007$ long. I know no form that can be better compared with a little ladder than this. I have therefore given it the above generic name.

(This form appears to be a very doubtful diatom. The author gives no side view, and the figure shows no connecting zone between the valves; it approaches more closely to *Triceratium malleus*, Brightwell, which is also a very doubtful diatom. (F. K.)

Plagiogramma spectabile. *Grev. Var. quadrigibbum. Grun.*—Valve lanceolate, constricted at the centre, and with two smaller constrictions between the ends and the central constriction, apices produced acute, central nodules, elliptical in a transverse smooth central fascia, median line absent; puncta minute (30 to 32 in. $\cdot 001$ in longitudinal and transverse lines). Costæ pervious. Pl. 6, fig. 7.

In Polycystin stone. Nankoori.

Differs chiefly from Greville's species in the greater number of its undulations, and the smaller number of its striæ, which towards the end are closer, whilst in Greville's figure they are equally distributed over the whole valve.

Cocconeis surirelloides. *Grun.*—Minute, valve broadly elliptical; upper valve median line narrow, straight, central nodule obsolete, costæ subradiant, 20 in. $\cdot 001$ furrow elliptical, submarginal interstices granulate. Pl. 6, fig. 11.

Lower (?) valve median line more or less arcuate, central nodule small, oblong, terminal, nodule approaching the apices, striæ punctate, delicate (50 to 54 in. $\cdot 001$), radiant furrows double, marginal one more or less approximate. Pl. 6, fig. 12.

In sand, from the roots of *Ecklonia buccinalis*, from St. Paul, in the South Sea.

A diminutive species. I am not certain whether the form described as the lower valve belongs to it. They occur commonly enough in the cleaned material of the same form, size, and quantity as the characteristic upper valve, so that they belong to each other is very probable. It is distinguished from *C. scutellum* in the costæ of the upper valve, and from the small form of *Campyloneis Grevillei* in the number of narrow costæ and delicate puncta. *Cocconeis costata*, Greg. has also much stronger costæ, and a broad lanceolate median space.

(I do not observe in the author's figures any resemblance to the *Surirellæ*, none at least to warrant his specific name. F. K.)

(*Berkeleya Harveyi*, of this form we have no additional description. The fig. (pl. 6, fig. 13) is apparently given to show the resemblance of the median line to *Amphipleura Frauenfeldiana*, and the transverse striæ. F. K.)

(An uncorrected printer's error occurs in the otherwise very correct text of the original paper; this would hardly have called for notice had it not been repeated in the catalogue of forms sent with Möller's Typen Platte, and repeated again in his printed catalogue, viz., *Craspedodiscus*, for *Craspedodiscus*. A similar repetition of a printer's error occurs in the very imperfect index to the diatomaceæ, figured in Qua. Mic. Jour., by C. J. Muller, Esq., vol. x., N.S. In the description of figures in Greville's paper, vol. xiv., page 79, *Croispedodiscus* is printed for *Craspedodiscus*, and the error has been repeated by the author of the index. F. K.)

CONTENTS OF PLATE VI.

- Fig. 1.—*Navicula gemmata*, var. *biseriata*.
- Fig. 2.—*Entopyla ornata*. a frustule, b portion of valve more enlarged.
- Fig. 3.—*Amphipleura Frauenfeldiana*. (Central nodule.)
- Fig. 4.—a. b. *Coscinodiscus ellipticus*.
- Fig. 5.—*Pleurosigma validum*; var. *nicobaricum*. a, valve; b, portion of ditto more enlarged.
- Fig. 6.—*I-thmia nervosa*, var. *nankooorensis*. a, frustule, b, portion more enlarged.
- Fig. 7.—*Plagiogramma spectabile*, var. *quadrigibbum*.
- Fig. 8.—*Stictodiscus californicus*, var. *nankooorensis*.
- Fig. 9.—*Asteromphalus nankooorensis*.
- Fig. 10.—*Climacodium Frauenfeldianum*.
- Fig. 11.—*Cocconeis surirelloides*, upper valve.
- Fig. 12.—" " lower valve.
- Fig. 13.—*Berkeleya Harveyi*.

Fig. 6 \times 200 diameters; fig. 10 \times 100 diameters; fig. 11 \times 1000 diameters; all the others (with the exception of 3 and 13, of which no amplification is given), are \times 500 diameters.



W. & Fotheringham, lith. Westminster

THE AGUE PLANT.

Some years since I became interested in the statements of Dr. J. H. Salisbury, of Cleveland, Ohio, in reference to the germs of ague. Dr. Salisbury* believes to have discovered the malarial essence in the cells of certain Palmelloid plants. Desiring to investigate the subject, I sought for the plants described by him, in the ague bottom of the Mississippi river, opposite Keokuk, Iowa, lat. $10^{\circ} 25'$. Not being provided with a suitable microscope, I was unable to discover the microscopic algæ described by the doctor. I was pleased, however, to find the fungi, samples of which I send you. Generally it answers Salisbury's description.

It does not correspond in these important particulars: Salisbury's plants are so minute that it requires a powerful lens to render them visible. A single specimen of plant may be discovered as you stand. Salisbury's plants were not less. These have roots $\frac{1}{8}$ or $\frac{3}{8}$ of an inch in length. They grow on the flat moist alluvium of the slough and river margins and their drying beds; in the vicinity of such localities they may be found on ordinary soil in damp places, even at some elevation. The specimens sent you are green; I have observed them slate-coloured, pink, and black. They vary in size from a mere point to $\frac{3}{32}$ of an inch in diameter. When in natural state they are globular in shape and of a fresh colour, when covered with water they swell and present a gelatinous appearance. They discharge their spores when ripe by splitting open at the top and a falling in, collapsing of the upper circumference; so that a discharged plant appears cup-shaped, and to the naked eye it seems to have lost the upper half of its circumference. So far as I have been able to determine with the imperfect means of observation at my command, the cells are composed of two walls, the outer green or (otherwise coloured), composed of laminated cells, the inner white and structureless. Upon puncturing the plants a liquid is forcibly ejected. I have never been able to discover the contained cells for want of a good microscope. By placing the cake of earth sent you in a plate, and adding water enough to make it of about the consistence of potter's clay, and keeping it at a temperature above 60° , you will find a fresh crop of the plant to develop, and you will thus have an opportunity of studying them. Should you allow them to flourish, and remain uncovered in your room, you might have the satisfaction of demonstrating the "cause of ague." This fungus was first found, so far as I know, by Dr. J. P. Safford, of Keokuk, who was kind enough to search for me while I visited an ague patient. In the locality of their growth they are to be seen in myriads, and near them, even on elevations of over 100 feet, everybody had the ague. The course of this disease seemed *pari passu* with that of the plant.

DR. JOHN BARTLETT, Chicago.

* See American Journal of Medical Sciences, 1866.

MYCOLOGICAL ILLUSTRATIONS, by W. W. Saunders and W. G. Smith, part 2, contains figures of *Agaricus obturatus*, *Fr.*, *Ag. meridarius*, *Fr.*, *Ag. porrigens*, *P.*, *Cortinarius elatior*, *Fr.*, *Hygrophorus limacinus*, *Scop.*, *Hy. russo-coriaceus*, *B. & M.*, *Agaricus albocyaneus*, *Desm.*, *Ag. inunctus*, *Fr.*, *Ag. confluens*, *P.*, *Ag. clavipes*, *P.*, *Ag. portentosus*, *Fr.*, *Ag. Taylora*, *B.*, *Ag. gloiocephalus*, *Fr.*, *Ag. lacrymabundus*, *Bull.*, *Ag. Candollianus*, *Fr.*, *Ag. Terreii*, *B. & Br.*, *Ag. Badhami*, *B. & Br.*, *Ag. subinvolutus*, *Batsch.*, *Ag. gracilis*, *Fr.*, *Ag. atomatus*, *Fr.*, *Ag. eximius*, *W. G. S.*, *Ag. candicans*, *Fr.*, *Ag. infundibuliformis*, *var. membranaceus*, *Fr.*, *Ag. strangulatus*, *Fr.*, *Thelephora fastidiosa*, *Fr.*, *Thel. caryophyllea*, *Fr.*, *Ag. elatus*, *Fr.*, *Ag. fastibilis*, *Fr.*, *Boletus purpureus*, *Fr.*, *Bol. parasiticus*, *Bull.*, *Agaricus carneus*, *Bull.*, *Ag. terreus*, *Sch.*, *Polyporus rutilans*, *Fr.*, *Poly. Stephensii*, *B. & Br.*, *Ag. majalis*, *Fr.*, *Boletus cyanescens*, *Bull.*, *Ag. patulus*, *Fr.*, and *Ag. acerbus*, *Bull.*

The venerable Fries has made some critical observations on this and the previous part, to which we shall have occasion to refer hereafter.

SCHISTOSTEGA OSMUNDACEA. Web. & M. Gathered by myself and Dr. Dowson in a sand cave near Farnham, in Oct., 1872, where in the spring of 1842 I found it fruiting in abundance. I believe this to be the only station nearer London than Nottingham.—W. W. REEVES.

CRYPTOGAMIC LITERATURE.

DR. ED. EIDAM, der gegenwartige Handpunkt der Mykologie mit Rücksicht auf d. Infections-krankheiten, 2nd ed. 72 cuts. Berlin.

BOTANISKA NOTISER (September). P. J. Hellbom, Lichenological excursions in Lule Lappmark, in 1871.

BOTANISKE ZEITUNG (Sept.) M. Woronin, Researches on the development of *Puccinia Helianthi* causing the disease of the "Sunflower."

JOURNAL OF BOTANY for October.—Recent Researches in the Diatomacæ, by Rev. Eugene O'Meara, A.M. On a new Erratic British Parmelia, by the Rev. J. M. Crombie, M.A., F.L.S.

MONTHLY MICROSCOPICAL JOURNAL for October.—On *Sphagnum neglectum*, Angs., by Dr. Braithwaite, with a plate.

KARSTEN, P. A. Fungi in insulis Spitsbergen et Beeren Eiland collecti.

HEDWIGIA, No. 9. Einige neue Hyphomyceten Berlin und Wiens, by Dr. C. O. Harz.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY,
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By THE REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 71.)

* **Hydnum (Apus) pulcherimum.** *B. & C.*—Kew. Gard. Misc. i. p. 235. Dimidiate, thick-lobed, spongy, between fleshy and fibrous, hirsute, zoned within, margin thin; prickles rather short, awl-shaped. No. 1648. Santee River. Ravenel.

* **Hydnum (Apus) septentrionale.** *Fr.*—No. 5203. Alabama, Peters. On Linden.

* **Hydnum (Apus) cirrhatum.** *Fr.*—No. 1419. Car. Inf. On oak. No. 4639. Alabama, Beaumont. Ohio, Lea. No. 2860. Car. Inf. On Liriodendron, orbicular, resupinate, spongy beneath, is apparently a resupinate form of one of the three foregoing species.

176. **Hydnum (Apus) glabrescens.** *B. & Rav.*—Umbrinum, pileo dimidiato, glabrato, concentric sulcato; aculeis elongatis, acutis, demum compressis. No. 1634. Car. Inf. Ravenel, on Carya. Ceylon, G. H. K. Thwaites. No. 385. Central Provinces. Pale umber, or reddish-brown, with a paler margin; pileus 1-3 inches across, dimidiate, more or less imbricated, and sometimes elongated, tomentose, gradually becoming smooth, deeply sulcated concentrically; prickles of the same colour as the pileus, acute, more or less compressed, about a line long.

* **Hydnum (Apus) flabelliforme.** *B.*—After examining a large series of specimens, this appears to be too closely allied to *H. Rhois*, Schwein. Indeed, it approaches so near to unusually thick specimens of *H. ochraceum*, that it is sometimes difficult to distinguish.

177. **Hydnum (Apus) plumarium.** *B. & C.*—Pileo conchiformi minuto, candido, villosa, aculeis acutis tomentosis. No. 4936. Car. Sup. On Viburnum.

Pileus 1-2 lines across, white, conchiform, villous; prickles acute, tomentose, pale flesh-coloured. Specimens occur not exceeding,

these in size, resupinate, with the margin reflected, and others nearly an inch across, also resupinate.

* **Hydnum (Resupinatum) fusco-atrum.** *Fr.*—No. 2422. *Car. Inf.* No. 2723. *Car. Inf.* on *Magnolia glauca*.

178. **Hydnum (Resupinatum) subvelutinum.**—*B. & C.*—Resupinatum, breviter reflexum subvelutinum ferrugineum, aculeis compressis apice pallidioribus subvelutinis. No. 6012. *Penns., Michener.*

Ferruginous. Some inches in breadth, resupinate, with one edge slightly reflected and somewhat velvety; prickles compressed, sometimes compound, paler at the tip, more or less velvety.

* **Hydnum (Resupinatum) membranaceum.** *Bull.*—No. 2025, 2185. No. 2924. *Car. Inf.* No. 935. *Ravenel.*

* **Hydnum (Resupinatum) ferruginosum.** *Fr.*—No. 2105, 2414. *Car. Inf.* 3950. *Penns., Michener.* 4861. *Alabama, Beaumont.*

179. **Hydnum (Resupinatum) amplissimum.** *B. & C.*—Crassum suberosum, effusum, intus pallidum fibrosum; aculeis subulatis acutis rufis. No. 5323. No. 5383.

New Eng., Sprague. On *Cerasus*.

Effused for several inches, irregular, $\frac{1}{2}$ an inch or more thick, of a firm corky substance, but fibrous when torn across; prickles elongated, subulate, acute, rufous.

180. **Hydnum (Resupinatum) xanthum.** *B. & C.*—Totum resupinatum tenue margine e subtiliter tomentoso ceraceo, aculeis xanthis sparsis compressis subdivisis ceraceis. No. 2266, 4445. *Car. Inf.* On *Castanea vesca*.

Two or three inches across, at first orbicular, white and delicately tomentose, then waxy; prickles lemon-coloured, scattered, compressed, often compound, tips, when perfect, white and tomentose.

181. **Hydnum (Resupinatum) Halei.** *B. & C.*—Tenue crustosum, aculeis brevissimis flavis demum obtusatis. No. 3657, 3666. *Louisiana, Dr. Hale.* On *Liriodendron*.

One inch or more across, thin, crust-like, with sometimes a very thin pale margin; prickles short, yellow, at length obtuse. Like many resupinate species difficult of definition, though distinct. *H. armeniacum*, *B. & Rav.* No. 1296, is apparently a younger state of the same species in which the subiculum is more evident.

182. **Hydnum (Resupinatum) chrysellum.** *B. & C.*—Totum resupinatum hic illic interruptum subiculo candido; aculeis elongatis flavis acutis. No. 3649. *Louisiana, Dr. Hale.*

About an inch across, entirely resupinate, interrupted by the white substratum; prickles elongated, acute, yellow. Allied to the last.

183. **Hydnum (Resupinatum) chrysodon.** *B. & C.*—Totum resupinatum tenue subiculo e fibrilloso ceraceo; aculeis paucis parvis elongatis acutis flavis. No. 2511. *Car. Inf.* On oak chips.

At first of a delicate fibrillose substance, which gradually acquires a waxy covering, on which the elongated acute yellow prickles are sparingly scattered.

184. **Hydnum (Resupinatum) fascicularia.** *B. & C.*—Totum resupinatum ceraceum pallidum; aculeis fasciculatis brevibus obtusis quandoque apice ciliatis. No. 4725. Car. Inf. On Nyssa. (No. 565, 1546, Rav.)

Widely effused, very thin, waxy, inseparable from the matrix, pallid, but varying in tint; prickles fasciculate, short, obtuse, sometimes ciliated at the top as in *Kneiffia*. No. 6105. Alabama, Peters. Specimens on *Carya*, distributed as *H. areolatum* are perhaps an advanced state of this species, in which the prickles are collected in groups, and approaching *H. udum*.

* **Hydnum (Resupinatum) udum.** *Fr.*—No. 2701. Car. Inf. On Acer. 4925. Car. Sup. On oak. (Rav. 935, 1546.)

* **Hydnum (Resupinatum) Himantia.** *Schwein.*—No. 6106. Alabama, Peters. On Fraxinus. Penns., Dr. Michener.

185. **Hydnum (Resupinatum) Cookei.** *B.*—Tenue, subliberum, subiculo membranaceo, hic illic byssoideo, fibrilloso; hymenio isabellino; aculeis brevibus obtusis. No. 6051. Car. Inf. On Liquidambar.

Thin, membranaceous, more or less separable from the matrix, here and there bysoid or fibrillose; hymenium of a brownish-buff, with scattered, short, obtuse, small prickles.

* **Hydnum (Resupinatum) pithyophilum.** *B. & C.*—Kew Gard. Misc. i. p. 235. Resupinate, effused, subiculum very thin, bysoid, farinaceous; prickles ochraceous, compressed, toothed, and lacerated above. No. 1501, 2060, 4811. Car. Inf. No. 5603. Connect., C. Wright. No. 4811, was originally named *H. mellitum*, but it appeared afterwards that it was discoloured by poison.

* **Hydnum (Resupinatum) ciliolatum.** *B. & C. l. c.*—Resupinate, thin, orbicular, scarcely separable from the matrix; prickles short, compressed, floccoso-ciliate. No. 1464, 2204. Car. Inf. No. 1779, Rav. On Magnolia glauca.

186. **Hydnum (Resupinatum) laticolor.** *B. & C.*—Late effusum, margine demum separabili subbyssoideo; aculeis late ochraceis compressis subvelutinis apice dentato-laceratis. No. 2930. Car. Inf. 4647, 5166. Alabama, Beaumont. On oak. (No. 894. Car. Inf. Rav.)

Effused for several inches, at length more or less separable at the margin, where it is slightly bysoid or tomentose; hymenium reddish-ochre; prickles compressed, somewhat velvety, toothed and lacerated at the apex. A fine species.

* **Hydnum (Resupinatum) mucidum.** *Fr.*—(No. 1503. Rav.) No. 6058. On Liquidambar. 6103. On *Carya*. Alabama, Peters.

The latter is infested with a *Sepedonium*.

* **Hydnum (Resupinatum) alutaceum.** *P.*—No. 563. *Car. Sup.* 1143. *Car. Inf.* (1531, *Rav.*) No. 3928, 6019. *Penns., Michener.* No. 4724. *Car. Inf.* No. 5599. *Connect., C. Wright.*

187. **Hydnum (Resupinatum) velatum.** *B. & C.*—Subiculo tomentoso, albo demum aculeos ceraceos brevibus subfasciculatis obducente. No. 2393. *Car. Inf.* On pine.

Subiculum white, tomentose, soon running over the short waxy prickles, which are sometimes fasciculate.

188. **Hydnum (Resupinatum) nudum.** *B. & C.*—Subiculo fere nullo, vel tenuissimo, farinaceo; aculeis sparsis ceraceis subulatis. No. 2220, 2407, 4489, 4823. *Car. Inf.* 6221. *Wisconsin, Lapham.* On *Polypori*, *Patellaria appplanata*, or on pine wood.

Subiculum almost obsolete, or extremely thin and farinaceous; prickles waxy, scattered, subulate, acute, easily coalescing.

* **Hydnum (Resupinatum) plumosum.** *Duby.*—No. 5712. *New Eng., Murray.* 6047. *Car. Inf.*

189. **Hydnum (Resupinatum) caryophylleum.** *B. & C.*—Totum resupinatum pulveraceum; aculeis in fasciculos subdigitatos connatis. No. 2330. *Car. Inf.* (1362. *Rav.*)

Entirely resupinate, white, becoming dingy and somewhat umber when old, pulverulent; prickles joined into distinct, somewhat digitate, flat, petal-shaped bundles.

190. **Hydnum (Resupinatum) fragilissimum.** *B. & C.*—Fragile, subiculo byssoideo, hic illic fibrilloso-repente; hymenio ceraceo aculeis brevibus subulatis. No. 2608. *Car. Inf.*

Extremely brittle when dry; subiculum white, byssoid, with a few creeping fibres; hymenium waxy; prickles short, distinct.

191. **Hydnum (Resupinatum) Nyssæ.** *B. & C.*—Subiculo eximie pulverulento; aculeis elongatis subulatis acutis quandoque apice fimbriatis. No. 3716, *Car. Inf.* 4362. *Penns., Michener.*

Subiculum copious, pulverulent; prickles elongated, subulate, acute, sometimes pencilled at the tip. Whole plant dry, of a dull buff.

192. **Hydnum (Resupinatum) parasitans.** *B. & C.*—Parasiticum, aculeis brevibus compressis obtusis. No. 6113. *Alabama, Peters.* On *Ulmus Americana.*

Parasitic on the teeth of some *Hydnum*; subiculum obsolete; prickles short, compressed, obtuse.

193. **Hydnum (Resupinatum) setulosum.** *B. & C.*—Subiculo candido lacteo membranaceo; aculeis flexuosis subulatis acutis subtiliter sutuloris. No. 6086. *Alabama, Peters.* On *Liquidambar.*

Subiculum membranaceous, white, forming a broad border to the hymenium, which is quite confined to the centre; prickles waved, subulate, minutely setulose under a lens. A very distinct species.

194. **Hydnum (Resupinatum) Murrail.** *B. & C.*—Subiculum membranous, thin, white; prickles scattered, subulate, acute; of a pinkish ochre. No. 5707. New Eng., Murray.

On very rotten wood. Subiculum, spreading widely, very thin, membranaceous, slightly byssoid and pulverulent; prickles scattered, of a reddish tint, subulate, smooth.

This species, perhaps, should come next to *H. Cookei*. It is, however, very difficult to say what is the colour of the prickles when fresh.

195. **Hydnum (Resupinatum) Micheneri.** *B.*—Subiculo e floccis intertextum hic illic fibrillis repentibus; aculeis verrucæformibus brevibus apice subciliatis. No. 4368. Penns., Michener.

Entirely resupinate; subiculum composed of interwoven flocci, which here and there send out creeping threads; aculei verrucæform, the tips sometimes minutely ciliated. This species approaches *Kneiffia*.

196. **Hydnum (Resupinatum) ischnodes.** *B.*—Subiculo e floccis intertextum hic illic fibrillis repentibus; aculeis subulatis gracilibus. No. 6093.

Subiculum as in the last, but the hymenium totally different; prickles slender, waxy, subulate or nearly cylindrical, almost rufous when dry.

* **Hydnoglæum gelatinosum.** *Cur.*—No. 2420. Car. Inf. On pine.

This is *Hydnum gelatinosum*, Scop., but differs materially in structure from *Hydnum*. There are two or three other species.

* **Hericium hystrix.** *Fr.*—No. 1751. Car. Inf.

* **Irpex pendulus.** *Fr.*—No. 3038, 3722. Car. Inf.

* **Irpex fusco-violaceus.** *Fr.*—No. 3937, 4269. Penns., Michener.

* **Irpex lacteus.** *Fr.*—No. 2199. Car. Inf. On oak.

* **Irpex mollis.** *B. & C.*—Kew Gard. Misc. i. p. 236.

Pileus dimidiate, plane; coriaceous, dirty white, tomentose; prickles long, compressed, tips subulate or dilated. No. 1729. Car. Inf. (1744. Rav.), No. 3203. Car. Inf. In some specimens the pileus is decurrent behind, or resupinate.

* **Irpex crassus.** *B. & C.*—Thick, corky; adnate behind and decurrent, subimbricate; pileus finely pubescent, zoned within, teeth lamellar, somewhat fimbriated at the tips. Two inches thick, teeth $\frac{1}{3}$ – $\frac{1}{2}$ inch long.

No. 170, Car. Sup. 3072, 3261. Sartwell, 3371, 3394. Massac. 3506. Penns., Michener.

* **Irpex sinuosus** *Fr.*—No. 5593. 5600. Connect., C. Wright.

197. **Ispex coriaceus.** *B. & Rav.*—Pileo dimidiato, portice decurrente imbricato tabacino concentrice sulcato tomentoso; dentibus ferrugineis compressis. (No. 1111. Rav.) Car. Inf.

Pileus tobacco-coloured, coriaceous dimidiate, decurrent behind; concentrically sulcate, $1\frac{1}{2}$ -2 inches across; teeth short, irregular, compressed, with a greenish bloom. This is *Hydnum trachyodon*. Lév. From Bogota. It is found also in Cuba.

198. *Irpex tabacinus*. B. & C.—Breviter reflexus subzonatus pubescens postice longe decurrens læte tabacinus. Hymenio concolore; dentibus compressis. No. 2358, 2932. Car. Inf. 2922. Car. Inf. A Polyporoid form. No. 3152. Texas, C. Wright (1088. Rav).

Shortly reflexed, imbricated, decurrent behind, velvety, sometimes zoned, bright brown; hymenium of the same colour; teeth compressed. Allied to the last, but the teeth have not the bloom of that species, and the pileus is less dimidiate.

199. *Irpex pityreus*. B. & C.—Parvus, brunneus; pileo conchiformi subvelutino sericeo, ezonato; hymenio concolore; dentibus compressis. No. 6329. Rhode Island, Bennett.

Pileus scarcely $\frac{1}{2}$ inch across, conchiform, brown, somewhat velvety, silky towards the margin; hymenium of the same colour; teeth compressed. Allied to the two last.

* *Irpex cinnamomeus*. Fr.—No. 1005, 1006, 1642, 1978. Car. Inf. No. 436, 447, 875. Car. Sup.

200. *Irpex Schweinitzii*. B. & C.—Resupinatus, subiculo membranaceo, separabili, margine sterili, brevi, byssoideo; dentibus carneo-griseis compressis. No. 4655. Alabama, Beaumont.

Scarcely exceeding $\frac{1}{2}$ an inch in breadth; suborbicular; subiculum thin, membranaceous, byssoid, separable from the matrix; teeth confined to the centre, compressed, pinkish-grey, subporiform.

SCHISTOSTEGA OSMUNDACEA.—Your correspondent (W. W. Reeves) is in error concerning this moss, as I find it abundantly at Guildford, in the holes made by sand martins. It was first pointed out to me by the celebrated cryptogamist, Mr. Borrer, in 1852-3.
E. CAPRON.

Uromyces Behenis. Lev.—“Campion Uromyces.” On both surfaces of the leaves, and on the stems; pustules subrotund or confluent, for a long time covered by the cuticle; spores coherent, ovoid, brown, on long hyaline pedicels.—*Leveille. Ann. Des Sc. Nat. viii.* (1847), pp. 371 *Kickx. Fl. Crypt. ii.*, p. 75. *Uredo behenis*, D.C. *Fl. Fr. vi.*, p. 63. *Cœoma behenis*, Link. *Sp. ii.*, 27.

On *Silene inflata* in company with *Æcidium behenis*. Near Chichester (Dr. Paxton). Aug.



BOTRYDIUM GRANULOSUM GREV.

BOTRYDIUM GRANULATUM, (DESV.)

By E. PARFITT.

This curious little plant, which is not uncommon in certain places in the neighbourhood of Exeter, and it is also generally distributed both in England and Scotland, has been known to botanists for a very long time, but as Dr. Greville observed in his *Algæ Britannicæ* in 1830, and I believe up to the present time, its fructification is not known, and so far as I have been able to find, the true structure, and peculiar physiology, have not been studied. Dilwyn in his "*British Confervæ*" p. 79 has done more to illustrate some of its peculiarities than any of the numerous writers that I have consulted, if his be really the same species that I have in view, and it differs only in one particular, and that is, he has made the underground stems in his figures septate. He says, "the joints are very long in the creeping stems," which is perfectly true. I have observed but one septum in the many specimens that I have examined. Dr. Greville has very accurately described this little plant, so far as a general description goes, and which is rendered quite sufficient for its distinction, but he has gone no farther. The Doctor says, "Plant about the size of a pin's head, sessile upon the surface of the ground, covering a large space in a densely crowded manner, composed of a hollow vesicle, not homogeneous as in the genus *Vancheria*, but filled with a watery fluid, which escapes by an irregular terminal orifice. The receptacles at length collapse, become cup-shaped, and then cover the ground with a thin greenish crust, like that of some lichens. At its under part, each receptacle is terminated by a very short neck, which divides into a radiating tuft of pale fibres. Substance fragile and membranaceous, colour a pale green," and he adds to this—"The fructification of this plant is not known. Does the watery fluid contain it? The structure of the receptacle seems minutely granular." In this description it will be observed nothing is said about the underground stems being septate. We may from this infer that Dr. Greville did not observe them. The specific name of this plant is *granulatum*, and as Dr. Greville and others have said, its surface seems minutely granular. Now this I have ascertained by careful microscopic examination to be not external, although the effect is seen on the surface of the vesicles, but it results from the pressure of the protoplasm and grains of chlorophyll on the inside.

The membranes composing the walls of the vesicles, for there are two, an outer and an inner membrane, although this cannot be ascertained with certainty, except at the base of the vesicles and where the inner membrane begins to dry up when it shows in folds, by carrying, and the breaking up of the endochrome, into folds with it, and in the underground stems, where they are distinctly visible, they appear to me to be perfectly structureless, that is, they

are thin transparent membranes only, without any cellular structure, and when the plant is alive they remain distended to their very utmost from the pressure of the fluid within. The young vesicle which, as will be observed, is only the swollen apex of a branch of the creeping or underground stem, when it emerges from the ground it is frequently only a clear transparent sac filled almost to bursting with a watery fluid; after a time minute green spherical grains will be seen, mostly adhering in little groups to each other, and at length they take up their position on the wall of the inner membrane, until the whole vesicle appears to be filled with them; but the vesicle being filled with them is only in appearance, as it is only the walls that are covered, with a few exceptions of granules floating in the fluid. When a full-grown plant is pressed between slips of glass and examined the membranes composing the vesicle will be seen to shrink up into folds, on which are seen the adhering granules. When the plants are full-grown the epidermis is furfuraceous, or having a number of minute scale-like processes attached to it, as if it were a very thin outer membrane broken up.

These vesicles have generally been treated as separate and distinct plants, but it will be observed by the sketch, and also Dilwyn has shown, that several of these vesicles are attached to underground stems, and I find, as it has been before observed, that the vesicles are only the apices of the young branches of underground stems. These, then, it will be observed, are all attached, forming a kind of system, the tubular stems connecting all the vesicles together, so that we have a minute spreading underground plant whose branches rise to the surface, where they swell into little ovate or spherical vesicles. Now Dilwyn has made his plant septate, or in other words, has divided the connecting tubes or stems by little nodes or rather diaphragms, consequently cutting off the communication between the different parts of the plants, so that it would be impossible for the granulose matter to traverse the tubes, except in the internodes. In my examination of groups of this plant, after having washed the stems perfectly clean, I could only detect one septum, and the tubes appeared to me perfectly free, and that the granulose matter can float freely in them. I noticed particularly that the full-grown plants contained the largest grains, with a large proportion also of minute granules, the larger generally having several of the minute ones attached to them. This led me to investigate them still further, and I now feel convinced in my own mind that the small granules are zoospores, which attach themselves to the larger or female grains, for on liberating some of these on a slip of glass and examining them carefully under the microscope, I distinctly saw the minute granules moving about as I have seen zoospores in fresh-water *Algæ*.

Finding some of the vesicles of apparently the same age as others containing only minute granules, whilst others contained both

large and small, I conclude that the small granules are generated in distinct vesicles, whilst others contain only female grains, and also that these free or moving zoospores have access through the tubes to the larger grains, as the tubes are all seen to be more or less filled with granulose matter. These larger grains are the means adopted by the plant for perpetuating its species—it may not be its true fruit. The Rev. M. J. Berkeley (“Introduction to Cryptogamic Botany”), page 157, foot-note, says:—“The plant figured by Cienkowski, in Bot. Zeit. 1855, tab. XI. as *Protococcus botryoides*, is probably a *Botrydium*, and if so, that genus produces large resting-spores and minute swarming-spores. It is said to grow with *Botrydium* (*Hydrogastrum granulatum*), and is certainly no *Protococcus*.”

Now, what I have stated here in regard to the smaller cells being filled with zoospores, and which appear to traverse the tubular underground stems to the larger cells, seems to confirm, to a great extent, the observations of Cienkowski.

This plant has been generally regarded as of very rapid growth, and of as quickly decaying, and so far as the vesicles above ground are concerned this is true, but I believe that the underground stems and roots remain for a considerable time, and that at certain seasons, when a favourable hygrometric condition favours the development of the branches, it bursts up again with new vigour, so that it may be termed perennial. I have frequently searched to find, if possible, some of the full-grown vesicles in conjugation, similar to those of the genus *Vancheria*, but have never been successful. I therefore conclude that the only mode adopted to perpetuate its species is the one I have indicated above; at the same time it would be well if observers would direct their attention to this curious little plant, and endeavour, if possible, to clear up this interesting portion of its history, for it is in these lowly forms that we detect the key to some of the more intricate structures in the larger and grander portions of the vegetable kingdom.

NOTES ON THE ABOVE COMMUNICATION.

By WILLIAM ARCHER.

This is a plant I have had but seldom an opportunity to see myself. Any new information in reference to it would no doubt be desirable. The paper you forwarded, however, I would venture to think, while it serves to draw fresh attention to this organism, has not an *à priori* probability in favour of the author's conclusions, and yet there is no saying they may not be true, so unexpected phenomena sometimes offer themselves. He is no doubt right that the plantlets, if we may so say, have a mutual intercommunication by their subterranean branching “rootlets.” Of course, as

regards the author's statement that the membrane is double, one cannot say nay. I did not notice that myself, but I would venture to suppose the possibility that he *may* have mistaken the boundary of the shrunken-in protoplasmic contents—the so-called “primordial utricle”—for an inner membrane. In several algæ this is seen, and looks very like a membrane. Still, doubtless, many algæ have laminated membranes. That immediately investing the contents remains generally firm, the outer *older* laminæ removable or “dissolvable.” The author has seen “zoospores,” but while he *calls* them by that name he seems to *regard* them functionally as *spermatozoids*, and that these travel across from certain of the “vesicles” by the under-ground connecting tubes to certain other “vesicles,” there to fertilize certain other larger “grains.” It would not befit one who has not followed out his observations to say nay again to this; but the view does not seem to have the ground of analogy. But it would not on *that* account be untrue. It would seem to be the case where spermatozoids occur that they are themselves generated within a more or less specialized structure, and, from which set free, that they proceed to act upon what the Germans would call a “Befruchtungskugel”—a specially differentiated portion or mass of protoplasmic matter, when fertilised an *oospore*—and not that in the same or an adjoining cavity one portion of the contents becomes spermatozoids, another the future oospore. Not only is the “oospore” thus a specialised body, but it is enclosed (singly or several) within a specialised “oogonium.” But the Conjugatæ are examples of germ-cell and sperm-cell (if you admit in that group the applicability of these terms), mutually co-operating, whilst the spore is not in a specialised “oogonium” (so as to say), but *both factors* in the process occupy a common cavity. The author's views may not, indeed, be impossible. If true it would degrade Botrydium considerably below Vaucheria, where the antheridia and the oogonia are highly differentiated. The author says he has not seen anything like the “conjugation” of Vaucheria. This is surely a misapprehension of his, for “conjugation” does not take place there (comparable to Spirogyra or Mesocarpus, &c.). The probability, I venture to think, is rather he has seen the zoospores (zoogonidia Aut.), not spermatozoids. Doctor Itzigsohn is stated to have seen zoogonidia. Since I came home I haven't had time to try and work up *where*. If the author's views were correct the larger grains would, I suppose, have necessarily to be regarded as its “true fruit,” for they would be *fertilised* protoplasmic masses. If, on the other hand, the motile bodies be only zoospores, this plant, as regards our knowledge of its history, would remain much in the position of several other algæ—say, for instance, Characium, &c. As, however, the contents have been seen simultaneously segmented into individual portions, if any fertilization occurs it would be more probable that *they* it is that would be acted upon by spermatozoids.

The following is Reinsch's account of this, given in his "Die Algenflora des mittleren Theiles von Franken," &c., pp. 218, 219:—

"The plant about $1\frac{1}{2}$ m.m. diam.; the upper portion, or that above ground, globular, gradually narrowing downwards, and passing into one or two principal roots, which become gradually ramified into many fine rootlets; the chlorophyll-contents at the beginning dense and homogeneous, and, clothing the inner cell-membrane, extends only to the neck of the root; the membrane is rather rigid, upon being broken the cell-contents become extruded, the membrane collapses as a thick pellicle, whose contents admit of being completely pressed out; the fluid contents in this condition consist of finely-granular plasma, tinged by chlorophyll-granules. Subsequently the green plasma layer becomes separated from the membrane, breaks up into single equal-sized portions, which become rounded off, coated with a membrane, and gradually individualized as daughter-cells. At last the entire globose cell is densely filled with rounded daughter-cells; whilst, previous to this state, the plant presented an intensely grass-green colour, it shows in this latter state a clear or sea-green colour; mature and immature plants hence readily admit of being distinguished by the tint with the unassisted eye. The membrane of the mother-individual at last passes to decay, it collapses, and the daughter-cells become the germs of new individuals in the soil. The maturity of the individuals occurs towards autumn, and accordingly the germ-cells lie resting in the earth during winter, and germinate in the following spring. The development of the germ-cells to new individuals takes place without formation of a 'prothallus,' ('ohne Vorkeimbildung.')

One end elongating as a root at once penetrates the earth, the other end becomes developed as the above-ground portion. The diameter of a ripe germ-cell is 0.009-0.012 m.m. The plants prefer to establish themselves on the surfaces of the large clefts which are produced when the waters retreat and the ground becomes gradually dried by the air."

The author refers to Cienkowsky's observations on "*Protococcus botryoides*." (Bot. Zeit. 1855.) This original paper I had not before seen; but at this point I stopped writing this letter, and went to the Royal Dublin Society's Library and fished it up. Berkeley, I fancy, is right in supposing this really refers to a *Botrydium*. Cienkowski's figure of *his* plant shows "resting-spores" and "swarm-spores." His fig. 8 rather shows something very like spermatozooids; quere then, may *his* "resting-spores" be really fertilised spores—true *oospores*? That author does not so interpret the matter. He only refers to "swarm-spores" and "resting spores," and does not infer any analogy with *Vaucheria*. If fig. 8 show really spermatozooids, they escape by the bursting of the parent cell (which would then be an "antheridium") at the summit, not by travelling round to meet the resting-spores in a *common* cavity; for *they* are separate cells (possible "oogonia"). The paper

you sent I should think must be interesting, and though possibly *à priori* open to some question, ought to serve to draw attention to a little-understood plant. There are some slight inaccuracies in phraseology; for one I would *presume* he means "spermatozoids" when he writes "zoospores," for they are physiologically and functionally distinct things. According to the "priority-laws" it would seem that this plant should pass rather as *Hydrogastrum granulatum* (Linn.) Desv. than as *Botrydium argillaceum* (Wallr.).—*Hydrogastrum* has priority over *Botrydium*, but the latter name is often employed in algological works, apparently without due regard to that circumstance.

DICRANUM UNDULATUM (EHRHART).

By R. BRAITHWAITE, M.D., F.L.S.

This may now with certainty be entered as a member of our Moss-Flora, Prof. Lindberg having detected it in Mr. Spruce's herbarium. Having recently paid a visit to that gentleman, he kindly gave me some of his original specimens, and informed me that he found it in August, 1842, growing in dryish sand-pits in a fir plantation on Stockton Forest, near York, and although specimens were sent to the late Mr. Wilson, it has no place in his "Bryologia Britannica." My friend Mr. Anderson, of Whitby, has found it again in the same locality a few weeks ago, and it is probable that it occurs in many other places, but, being barren, has not been distinguished from *D. scoparium* or *D. Bonjeanii*; at least, this is much more probable than that such a widely diffused Continental and American species should be totally absent from Britain.

Mr. Spruce informs me that it is not uncommon in the lower Pyrenees, growing in grassy glades of sandy woods.

D. scoparium is at once separated by its non-undulated leaves, and we may indicate the other two by the following diagnostic characters.

Dic. undulatum. *Ehrt.*—Pl. Crypt. exsic., 271 (1791), *Bryum rugosum*, Hoffm. Deutsch. Fl. ii. p. 39 (1795). *Dic. polysetum*, Swartz. Musc. Suec. p. 34, t. iii. f. 5 (1798).

Setæ aggregated; stems naked and decumbent at base; leaves patulous, the uppermost somewhat falcato-secund, or appressed and slightly secund, from a broad oblong base, lanceolate, gradually narrowed into a dagger-shaped point, ending somewhat abruptly in the acute apex, beautifully undulate in the upper half, carinate; margin revolute below, coarsely serrate above, the teeth spinulose and somewhat irregular in direction; nerve flattened, narrow and extended to apex, narrowly two-winged and serrated at back; cells elongate-oblong or elongate-hexagonal, those of the central base subquadrate and hyaline.

Dic. Bonjeanii. *De Notaris.*—Syllab. Musc. p. 213 (1838). c. Müll. Synop. I. p. 369. (1849).

D. palustre, Bryol. Eur. Wilson, Bry. Brit.

D. undulatum, Turner, Mus. Hib.

Seta solitary; stem erect; leaves more or less erecto-patent, straight, from a broad linear flat base, broadly oblong-lanceolate, gradually narrowed into a strap-shaped point, tapering into an acute apex; lightly undulate above, canaliculate; margin acutely serrate above, the teeth uniform in shape and direction; nerve very narrow, vanishing below apex, smooth at the back; cells at base short, quadrate, brownish; above elongate-hexagonal or parallelogramic, the uppermost elliptic oblong. Schimper erroneously describes this species as having leaves "serrated on the back," so that it seems barren specimens of the two species are liable to be confounded by the best authorities. De Notaris, in his "Syllabus," points out the difficulty of distinguishing them, a difficulty which does not seem greatly lessened in our own day, especially since both are subject to considerable variation. The British specimens of *D. undulatum* certainly show little approach to the falcate direction, usually observable in continental specimens. De Notaris, in his *Epilogo della Briol. Ital.* points out that La Pylaie's specimens of *Dicr. palustre* (Bridel Bryol. Univ. i. p. 814) belong to *Campylopus flexuosus*, and hence the name *Bonjeanii* is to be preferred.

I hope on a future occasion to illustrate the subject of these notes by figures, and in the meantime leave the point to be further elucidated by our numerous collecting bryologists.

NOTE ON SPHAGNUM NEGLECTUM.—I have just received a letter from Prof. Lindberg, in which that great Bryologist informs me that he has identified *Sphagnum neglectum*, Angst., with an original specimen of *Sph. laricinum*, Spruce. This celebrated observer detected the plant in 1846, in Terrington Carr, Yorkshire, and since that time its place in the genus or its title to specific rank has never been settled; *Sph. neglectum* therefore drops into a synonym, and the species must stand as *Sph. laricinum*, Spruce. The figure 6x in my plate, representing a section of the leaf, is erroneous, for the chlorophyllose cells are elliptic and central, just as in *Sph. subsecundum*, to which, indeed, *S. laricinum* appears to stand in the relation of a sub-species. Angstrom described both *S. laricinum* and *S. neglectum* as species in the "Ofver. Vet. Ak. Förhandl.," for 1865, but Prof. Lindberg points out that the Lapland specimens collected by him and published under No. 712, in Rabenhorst's "Bryotheca," as *Sph. laricinum*, and also those of Austin's "Musci Appalach," do not belong to the species, but to *S. cuspidatum*. Fine specimens of *S. laricinum* in fruit, from the Island of Aland and Stockholm, accompanied the note.—R. BRAITHWAITE, in "Monthly Microsc. Journal."

BRITISH FUNGI.

By M. C. COOKE.

(Continued from p. 88.)

Cortinarius (Phlegmacium) triumphans. Fr. "Magnificent Cortinarius."

Pileus fleshy, convex, then plane, viscid, even, at first spotted with evanescent darker adpressed scales; stem solid, clavate, concentrically squamose beneath the ring; gills emarginate, quite entire, crowded, pallid, then clay-coloured.—Fr. *Epicr.* p. 256. *B. & Br. Ann. N. H.*, No. 1263. *Cortinarius sublanatus.* Hussey *Myc. Illus.* ii. t. 22.

In woods.

A large species. Pileus yellowish.

Cortinarius (Myxadium) pluvius. Fr. "Pluvial Cortinarius."

Pileus rather fleshy, globose, then convex, smooth, viscid, hygrophanous; stem stuffed, then hollow, slender, nearly equal, soft, white, becoming pallid; gills decurrent, then seceding, white, then ochraceous.—Fr. *Sys. Myc.* i., 36. Fr. *Epicr.* p. 277. *B. & Br. Ann. N. H.*, No. 1267. *Secr.* No. 265.

In woods. Lea. Sept.

Pileus $\frac{1}{2}$ –1 in., stem sometimes short, sometimes 3 in. long, 2–3 lines thick. Gills at length free, pallid.

Cortinarius (Dermocybe) anthracinus. Fr. "Fiery-gilled Cortinarius."

Pileus innato-fibrillose, brownish cinnamon; stem fibrilloso-striate, pallid; gills very much crowded, narrow, fiery-yellow, blood-red when rubbed.—Fr. *Epicr.* p. 288. *B. & Br. Ann. N. H.*, No. 1269.

In a wood. Coed Coch.

Certainly different from *C. sanguineus*. The Welsh plant exactly accords with a drawing from Fries. *B. & Br.*

Stem 2 in. long, 1–2 lines thick.

Cortinarius (Dermocybe) orellanus. Fr. "Red fleshed Cortinarius."

Pileus fleshy, obtusely umbonate, villosa-squamulose or fibrillose, tawny orange, flesh reddish; stem solid, firm, nearly equal, striato-fibrillose, tawny; gills adfixed, broad, rather distant, at length opaque.—Fr. *Epicr.* p. 288. *B. & Br. Ann. N. H.* No. 1270.

On the ground in a wood. Coed Coch. Oct.

With *C. cinnamomeus*, to which it is nearly related, but very distinct.

Cortinarius (Telamonia) bivelus. Fr. "Twin-veiled Cortinarius."

Pileus fleshy, convex, then plane, obtuse, smooth, or silky at the margin, brick red, becoming tawny; stem firm, rather bulbous, dirty whitish; spurious ring fugacious; gills adnexed, scarcely crowded, bright tawny cinnamon.—Fr. *Epicr.* p. 292. *B. & Br. Ann. N. H.* No. 1271. *Fr. Obs.* ii. 58. *Fr. Sys. Myc.* i. 215.

In woods. Coed Coch. Oct.

Pileus soft, bibulous, moist, but not truly hygrophanous.

Cortinarius (Telamonia) incisus. *Fr.* "Incised Cortinarius."

Pileus rather fleshy, between conical and convex, at length plane, umbonate, naked, soon innato-fibrillose or squamose, hygrophanous; stem somewhat stuffed, equal, fibrillose with ferruginous fibrils, veil interwoven into a ring, or obsolete; gills adnate, distinct, scarcely crowded, cinnamon becoming ferruginous.—*Fr. Epicr. p. 301. B. & Br. N.H., No. 1272. Fr. Sys. Myc. i. 213. Bull. t. 586, f. 2.*

On the ground. Loughborough.

Gregarious. Stem 1 in. high, 1-2 lines thick. Pileus ferruginous tawny, olivaceous brown or brownish when young.

Cortinarius (Telamonia) hæmatochelis. *Fr.* "Blood-cinctured Cortinarius."

Pileus fleshy, thin, silky or fibrillose, brownish or pallid testaceous; stem solid, attenuated upwards, with a rufous zone below the middle, gills adnate, crowded, rather narrow, pallid cinnamon.—*Fr. Epicr. p. 302. Huss. Illust. vol. i. t. 19. Bull, t. 527, fig. 1? B. & Br. Ann. N.H., No. 1273.*

In woods. Coed Coch. Oct.

Cortinarius (Hygrocybe) subferrugineus. *Fr.* "Rusty Cortinarius."

Pileus fleshy, convex, then expanded, obtuse or gibbous, becoming smooth, testaceous grey, becoming ferruginous, rather hygrophanous; margin thin, stem solid, spongy, rigid externally, stout, somewhat bulbous, whitish, then dingy white, fibrillose veil fugacious; gills emarginate, scarcely crowded, broad, opaque, pallid, then becoming ferruginous.—*Fr. Epicr. p. 303. Batsch. El. f. 186. B. & Br. Ann. N.H., No. 1275. Fr. Sys. Myc. i. 234. Weinm. p. 157.*

In woods. Coed Coch. Sept.

Odour and taste unpleasant.

Cortinarius (Hygrocybe) obtusus. *Fr.* "Obtuse Cortinarius."

Pileus submembranaceous, conico-campanulate, striate to the middle, flesh coloured; stem hollow, soft, ventricose, adpressedly fibrillose, growing pallid; gills adnato-ventricose, rather distant, tawny cinnamon, edge fringed with white.—*Fr. Epicr. p. 313. Fr. Sys. Myc. i. 233. B. & Br. Ann. N. H., No. 1274. Weinm. p. 183. Secr. No. 247.*

In woods. Coed Coch. April.

Paxillus filamentosus. *Fr.* "Filamentose Paxillus."

Pileus fleshy, excentric, gibbous, at length depressed, torn into dense villous scales; margin thin, inflexed; stem solid, attenuated downwards, sub-incurved; gills crowded, narrow, straight, white, then yellowish, simple behind.—*Fr. Epicr. pp. 317. Buxb. iv. t. 8, f. 1.*

On the ground. Aug. Forres.

Stem from an inch in length, and $\frac{1}{2}$ in. thick, lateral. Pileus $1\frac{1}{2}$ -3 in. broad, tawny-yellowish. Gills decurrent, at length becoming darker.

NEW BRITISH NITOPHYLLUM.

Dr. J. E. Gray has kindly drawn our attention to a recent and valuable memoir by J. G. Agardh, entitled "Bidrag till Florideernes Systematik," with which Algalogists in this country should make themselves acquainted. Apart from the new and systematic arrangement of the Florideæ which it contains, descriptions of new species are interspersed, and one of these is from our own coasts. The specimen was communicated to the author by Mrs. Griffiths, under the name of *Nitophyllum Hilliæ*, and is here described as follows:—

Nitophyllum litteratum. *J. Ag.*—Stem short, cuneate; frond rather obscurely venose beneath with dichotomous anastomosing veins, cuneato-reniform, palmately pinnatifid, lobes linear-cuneate, margin minutely undulato-crenulate, base contracted, sori seriate between the veins, more or less confluent amongst themselves, forming irregular figures.

The shores of England (Mrs. Griffiths).

Sori not punctiform and scattered, as in *N. Hilliæ*, but linear, oblong, or variously configurate, seriate between the veins. The substance is also thicker.

CRYPTOGAMIC LITERATURE.

MONTHLY MICROSCOPICAL JOURNAL for December.—On the structure of the valves of *Eupodiscus Argus* and *Isthmia enervis*, showing that their silicious deposit conforms to the general plan of deposition in simpler forms, by Henry J. Slack, F.G.S.

HEDWIGIA, No. 10 (1872), contains "*Pyrenomycetes novi Austriaci*," by George Winter.

PILZE AN QUITTENÄSTEN, von Stefan Schulzer von Muggenburg, in *Verh. d. Zool. Bot. Gess in Wien*, xxi., 1871, abstracted in *Hedwigia*, No. 10 (1872).

NOTES ON THE LICHENS IN SOWERBY'S HERBARIUM, Part ii., by Rev. J. M. Crombie, M.A., F.L.S., in "*Journal of Botany*," for Dec., 1872.

RECENT RESEARCHES IN THE DIATOMACEÆ, Part v., by the Rev. Eugene O'Meara, A.M., in "*Journ. Bot.*," Dec., 1872.

THE MOSSES OF OXFORDSHIRE AND THE NEIGHBOURHOOD OF OXFORD, by Henry Boswell, in "*Journ. Bot.*," Dec., 1872.

BLIGHTS ON TEA AND COFFEE, by M. C. Cooke, in "*Gardener's Chronicle*," Nov. 30, 1872. pp. 1588.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY,
AND ITS LITERATURE.

BRITISH FUNGI.

By M. C. COOKE.

(Continued from p. 111.)

Hygrophorus limacinus. *Fr.* "Slimy Hygrophorus."

Pileus fleshy, convex, then plane, smooth, glutinous, umber, then fuliginous; margin paler; stem solid, firm, ventricose, fibrilloso-striate, viscid, squamulose above; gills rather thin, white, then cinereous.—*Fr. Epicr. p. 324. B. & Br. Ann. N. H., No. 1277. Paul, t. 77, f. 3.*

In woods, &c. St. Leonards.

Hygrophorus caprinus. *Fr.* "Streaky Hygrophorus."

Pileus fleshy, fragile, conical, then flattened, and umbonate; at length depressed, subrepand, moist, streaky, as well as the stem, which is solid, fibrillose, fuliginous; gills deeply decurrent, thick, scarcely distant, white, then glaucous.—*Fr. Epicr. p. 326. B. & Br. Ann. N. H., No. 1278.*

In pine woods. Near Bath.

Hygrophorus turundus. *Fr. Epicr. p. 330. Ag. superbus. Lasch in Linn. iii. No. 118.*

Var. **mollis.**—*B. & Br.* Golden yellow; pileus nearly plane, at length slightly depressed, clad with short radiating soft hairs of the same colour; stem equal, stuffed; gills distant, arcuate, decurrent.—*B. & Br. Ann. N. H., No. 1279.*

In plantations on the naked soil. Coed Coch. Oct.

Pileus $\frac{1}{2}$ – $\frac{3}{4}$ in. across; stem 1–1 $\frac{1}{4}$ in. high, 1–2 lines thick; gills narrow.

Hygrophorus irriguus. *Fr.* "Moist Hygrophorus."

Pileus rather fleshy, campanulate, then expanded, somewhat umbonate, even; stem fistulose, equal, tough, smooth, viscid, livid; gills rather decurrent, somewhat distant, whitish.—*Fr. Epicr. p. 329. B. & Br. Ann. N. H., No. 1280.*

In grassy pastures. Laxton, Norths. Oct.

Russula nauseosa. *Fr.* "Nauseous Russula."

Rather mild, strong scented, fragile; pileus fleshy, thin, plane, rather swollen, then depressed and infundibuliform, viscid; disc darker, margin sulcate, submembranaceous, stem stuffed, rather striate, white; gills adnexed, ventricose, somewhat distant, yellow, then dingy ochre.—*Fr. Epicr. p.* 363. *B. & Br. Ann. N. H., No.* 1283.

In pine woods. Coed Coch. Bowood. Oct.

Lentinus resinaceus. *Trog.* "Gummy Lentinus."

Pileus somewhat fleshy, slightly excentric, villous, rather gummy, ochraceous cinnamon, stem unequal, tomentose, gills crowded, serrated, whitish.—*Trog. Reg. Bot. Zeit.,* 1832, *p.* 525. *B. & Br. Ann. N. H., No.* 1283.* *Fr. Epicr. p.* 391.

On trunks. Forbes, N.B.

Boletus collinitus. *Fr.* "Ringless yellow Boletus."

Pileus pulvinate, even, with an evanescent tawny gluten, growing pale, stem firm, rather attenuated downwards, ex-annulate, white, then becoming brownish, somewhat reticulated with adpressed scales, pores adnate, elongated, didymous, pallid, then yellow, mouth naked.—*Fries. Epicr.* 410. *B. & Br. Ann. N. H., No.* 1284.

In fir woods. Ascot. Nov.

With the stature and color of *B. luteus*, but absolutely ex-annulate.

Boletus pruinatus. *Fr.* "Brown mealy Boletus."

Pileus convex, then plane, rigid, dry, becoming purplish-bay, smooth, sprinkled with an umber powder, stem firm, somewhat ventricose, even, smooth, yellow, or variegated with reddish, punctate at the base, tubes adnate, minute, pallid yellow.—*Fries. Epicr.* 414. *B. & Br. Ann. N. H., No.* 1285. *Bull. t.* 393, *f.* B. c.

On grassy ground. Kew, &c.

Pileus 2 in. and more broad, scarcely rimose, margin obtuse; flesh white, firm, reddish beneath the cuticle.

Polyporus melanopus. *Fr.* "Black-stemmed Polyporus."

Pileus between fleshy and tough, plane, then infundibuliform, white, then yellowish-brown, at first finely flocculose; stem excentric, rather velvety, incurved, thickened downwards, black; pores decurrent, short, minute, obtuse, unequal, white.—*Fr. Epicr. p.* 439. *Rostk. t.* 4. *Fr. Sys. Myc. i.* 347. *B. & Br. Ann. N. H., No.* 1286.

On dead wood. Scotland.

Polyporus (Flacodermi) populinus. *Fr.* "Poplar Polyporus."

White, pileus between corky and woody, rigid, not zoned, villous, internally of the same colour; margin obtuse; pores minute, short, rounded.—*Fr. Epicr. p.* 472. *Fl. Dan. t.* 1791. *Fries. Sys. Myc. i.* 367. *B. & Br. Ann. N. H., No.* 1288.

On the trunk of a poplar. Lincolnshire.

Has very much the habit of *P. connatus*.

Polyporus (Resupinatus) micans. Ehr. "Glistening Polyporus."

Effused, thin, flesh-coloured, becoming whitish; circumference byssoid, whitish; pores honeycombed, angular, somewhat crenate.—Ehr. *Silv. Ber.* p. 30. *Fries. Epicr.* p. 484. *Fries. Sys. Myc.* i. 383. *B. & Br. Ann. N.H.*, No. 1289.

On dead wood. Leigh Wood. Oct.

Polyporus (Resupinatus) hibernicus. B. & Br. "Irish Polyporus."

Wholly effused, not separable, white; margin thin, tomentose; pores small, angular; dissepiments rather rigid.—*B. & Br. Ann. N.H.*, No. 1291.

On decorticated branches of fir. Co. Wicklow. Sept.

At first orbicular, then by confluence forming effused patches, with a narrow, very thin, tomentose margin; pores $\frac{1}{2}$ in. across; dissepiments mostly entire. Apparently nearer to *P. radula* than to *P. vaporarius*.—*B. & Br.*

Polyporus (Resupinatus) farinellus. Fr. "Mealy Polyporus."

White, vaguely effused, thin, interwoven with a naked flocculoso-pulverulent mycelium; pores thin, contiguous, unequal, rather flexuous, intricate.—*Fries. Sys. Myc.* i. 384. *Fr. Epicr.* 487. *B. & Br. Ann. N.H.*, No. 1292.

On beech. Dec.

Trametes Bulliardii. Fr. "Bulliard's Trametes."

Pileus corky, flattened, even, smooth, white then tawny, at length zoned; pores long, subrotund, unequal, pallid, then rufescent.—*Fries. Epicr.* 491. *B. & Br. Ann. N.H.*, No. 1293. *Bol. suaveolens*, *Bull.* p. 342, t. 310.

On dead wood. Oct.

Hydnum scrobiculatum. Fr. "Furrowed Hydnum."

Ferruginous, pileus between corky and coriaceous, clavate, then plane or infundibuliform, pubescent; disc furrowed, squamose, zoned within, stem very short, naked, rooting; spines very short.—*Fries. Obs.* i. 143. *B. & Br. Ann. N. H.*, No. 1294. *Mich. Gen.* t. 72, f. 7. *Bull.* t. 156, var. a.

In fir woods. Oct. Nov.

Hydnum melaleucum. Fr. "Black and white Hydnum."

Pileus coriaceous, thin, rigid, irregularly striate, as well as the slender, smooth stem, black; margin and spines white.—*Fries. Epicr.* 510. *B. & Br. Ann. N. H.*, No. 1295. *Schoff. t.* 272.

In fir woods. Ascot.

Hydnum cirrhatum. P. "Cirrhose Hydnum."

Pileus fleshy, expanded, cirrhoso-fibrillose, pallid, margin fimbriate, incurved; spines very long, rather tough, equal.—*Pers. Syn.* 558. *Fries. Sys. Myc.* 411. *Fries. Epicr.* 513. *Flor. Dan.* t. 1789, f. 2. *Weinm.* p. 361.

On beech. Epping Forest. (J. English.)

At first whitish, then yellowish or rufescent.

Hydnum bicolor. *A. & S.* "Two-colored Hydnum."

Subiculum broadly effused, tomentose, adpressed, thin, white; spines minute, short, white, villose, apex naked, acute, rufous brown.—*Alb. & Schw. Consp.* 270. *Fries. Epicr.* 518. *Fr. Sys. Myc.* 417. *B. & Br. Ann. N.H.*, No. 1297.

On Bramble. Batheaston. March.

Odontia barba-Jovis. *Fr.* "Jupiter's beard Odontia."

Between byssoid and membranaceous, effused, separable, white, then yellowish, warts at first papillose, then conical, apices orange, fimbriate.—*Fries. Epicr. p.* 528. *B. & Br. Ann. N.H.*, No. 1299. *Sow. t.* 328. *Bull. t.* 481, f. 2.

On decayed wood. Epping.

Stereum frustulosum. *Fr.* "Frustulose Stereum."

Woody, resupinate, tuberculose, crowded, and almost confluent, afterwards apparently broken up into frustules, beneath and around the margin smooth, bay-brown, becoming blackish, hymenium convex, cinnamon, growing pale, pruinose.—*Fries. Sys. Myc.* 445. *Fries. Epicr.* 552. *B. & Br. Ann. N.H.*, No. 1300.

On hard oak wood. South of England.

Solenia fasciculata. *P.* "Fasciculate Solenia."

Gregarious, somewhat fasciculate, between clavate and cylindrical, becoming nearly smooth, white.—*Pers. Myc. Eur. t.* 12, f. 8-9. *B. & Br. Ann. N.H.*, No. 1301, t. 18, f. 4. *Fries. Sys. Myc.* ii. 200. *Solenia candida.* *Moug. Exs. No.* 96. *Cooke Handbook*, 956. *Br. Bath Trans.* 1870, p. 90.

On rotten beech. Jan.

This was included in the Handbook in error, under the name of *Solenia candida*.

Clavaria spinulosa. *Pers.* "Spinulose Clavaria."

Stem rather thickened, short, pallid; branches elongated, crowded, straight, attenuated, approaching cinnamon colour.—*Pers. Obs.* ii. t. 3, f. 1. *B. & Br. Ann. N.H.*, No. 1302. *Fries. Epicr. p.* 574.

In pine woods. Coed Coch.

Stem thick at the base, but not so thick as in Persoon's figure. *B. & Br.*

PTERULA. *Fr.*

Caulescent, coriaceous, apex at first fimbriate or compressed.—*Fr. Summ. Veg. Scan. p.* 339. *Fr. Sys. Myc.* iii., 285.

Pterula multifida. *Fr.* "Multifid Pterula."

B. & Br. Ann. N.H., No. 1304. Sept. 1865.

We have been unable at present to meet with a description of this plant.

ON SAPROLEGNIÆ.

By DR. ANTON DE BARY.*

The existence of a sexual generation in a certain number of Fungi has latterly been demonstrated. The Mucorini offer an example of a copulation which, in my idea, and that of M. Hofmeister, is a particular form of this mode of generation; and, since Micheli and Bulliard a multitude of Fungi are, at any rate, supposed to possess sexes, flowers, anthers, &c.

We will first quote the Saprolegniæ, the sexual organs, and the fecundation of which were first discovered by M. Pringsheim, and described by him.† In the types which may be imagined to be monœcious, such as the *Saprolegnia monoica*, the *Pythium* and our *Aphanomyces*, the female organs consist of oogonia, that is to say, of cells which are at first globose, and rich in plastic matters, which most generally terminate short branches of the mycelium, and which are but rarely seen in an interstitial position. The constitutive membrane of the adult oogonium in *Saprolegnia monoica* is reabsorbed in a great number of points, and is there pierced with rounded holes. At the same time the plasma is divided into a larger or smaller number of distinct portions which are rounded into little spheres, and separate from the walls of the conceptacle, in order to group themselves in its centre, where they float in an aqueous liquid. These gonospheres are then smooth and bare; on their surface there exists no membrane of the nature of cellulose. In the genera *Pythium* and *Aphanomyces*, and in some of the *Saprolegniæ* all the plasma of the oogonia is condensed into one solitary central sphere, surrounded by liquid.

During the formation of the oogonium, there arise from its pedicel, or from neighbouring filaments, slight, cylindrical, curved branches, sometimes twisted around the support of the oogonium, and which all tend towards this organ. Their superior extremity is intimately applied to its wall, then ceases to be elongated, becomes slightly inflated, and is limited below by a septum; it is then an oblong cell, slightly curved, filled with protoplasm, and intimately applied to the oogonium; in one word, an *antheridium*, or the organ of the male sex. Each oogonium possesses one or several antheridia. Towards the time when the gonospheres are formed, it may be remarked that each antheridium sends to the interior of the oogonium one or several tubular processes which have crossed its side wall, and which open at their extremity in order to discharge their contents. These, while they are flowing out, exhibit some very agile corpuscles, the diameter of which is barely equal to .002 m.m., and which, considering their resemblance to what are termed "spermatozoids" in the *Vaucheriæ*, ought to

* Translated from "Morphologie und Physiologie der Pilze," in Hofmeister's "Handbuch," vol. ii., cap. v., p. 155. By the Editor.

† Pringsheim's "Jahrbucher," vol. i., p. 284, vol. ii., p. 205.

be regarded as the fecundating corpuscles. After the evacuation of the antheridia, the gonospheres are found to be covered with cellulose; they then constitute so many oospores, with solid walls, if I may use an expression specially applied to the algæ by M. Pringsheim. Phenomena which are analogous in several respects and have been studied in the *Vaucheria* and other confervæ, as also direct observations which are due to M. Pringsheim, do not permit of any doubt but that the cellulosic membrane, which appears on the surface of the gonospheres, is only the consequence of sexual fecundation, and that this ought not to be attributed to the corpuscles which issue from the antheridea, which would penetrate into the gonospheres, and unite with their substance.

In *Saprolegnia dioica* and *Achlya dioica*, the gonospheres and the oogonia are formed in the manner we have just described; the membrane of these latter is pierced with openings or pores, and yet no antheridia-bearing filament is seen to be applied to it. It must be elsewhere that M. Pringsheim has seen organs which everything authorizes us to qualify as antheridia. Thick tubes, similar to those which engender the zoospores, spring from the mycelium at a given moment, and are divided by septa into a series of cylindrical cells, each of which is an antheridium. In *Saprolegnia dioica*, the plastic contents of the antheridia are transformed into an infinitude of very small vacillary corpuscles which escape with much agility by the orifice of a prolongation of the antheridium, made in the manner of a neck and very short. The antheridium of *Achlya dioica* is cylindrical, the plasma which it encloses is divided into particles which have nearly the volume of the zoospores of the plant. These particles become globose cells, grouped in the centre of the antheridium. Posteriorly the contents of these latter cells are divided into numerous bacillary spermatozoids, which first break the wall of their mother-cell, and then issue from the antheridium in the same manner as the spermatozoids of *Saprolegnia dioica*. These corpuscles, in the two plants of which we are speaking, resemble the spermatozoids of the *Vaucheria*; they are bacillar, and their agility is assisted by a long cilium. It is presumable that here, as in the algæ, concerning which we have positive demonstration, the spermatozoids introduce themselves into the cavity of the oogonium, and unite with the gonospheres. On this point, however, observations are wanting, and therefore we cannot consider ourselves perfectly sure in our appreciation of the organs of which we have just treated.

We may also class amongst bodies of a doubtful nature, but which are certainly worthy of further observation, the organs first seen by M. Nageli, then by M. Alex. Braun, and M. Cienkowski, and, lastly, by M. Pringsheim, who has carefully described them, and who considers them to be the probable antheridia of some species of *Achlya* or *Saprolegnia*. These bodies, according to the learned Professor of Jena, have their origin in thick filaments or

tubes, similar to those which form the zoosporangia, and represent so many distinct little masses of plasma in the midst of a homogeneous and parietal ganglium; the contents of these plastic masses are soon delineated in a more precise manner; we see in their interior some homogeneous granules, which are at first globose, then oval, and finally pass to the enlarged and ampullæform extremity of the generating tube; there they become rounded or oval cells, covered with cellulose, and emit from their surface one or several cylindrical processes, which elongate towards the wall of the conceptacle, and pierce it, without, however, ever projecting very far beyond it. At the same time the lacunose plasma of each cell is divided into a multitude of corpuscles, the diameter of which equals about .004 m.m.; these escape by the open extremity of the cylindrical neck of which we have spoken, and, as regards their organization and agility, they resemble the spermatozoids of *Achlya dioica*. In water these corpuscles quickly become motionless, and do not germinate. During the development of these organs, the protoplasm of the utricle, which contains them, offers at first quite normal characteristics, and disappears entirely by degrees as they increase. That these organs belong really to the *Saprolegnia*, which presents them and constitute its antheridia, there are good reasons to believe, as M. Pringsheim has shown. Another opinion, which the same author refutes, is that the corpuscles in question are parasites from outside, entered into the cavities of the *Saprolegnia*, and which fructify at the expense of its protoplasm. This opinion relies principally on the great resemblance of these corpuscles to certain veritable parasites, such as *Chytridium*. It may also be supported by the fact that M. Pringsheim has sometimes observed near the corpuscles in question, and in their conceptacles, globules similar to those which have been often met with in the *Spirogyra*, the *Vaucheria*, and other Algæ, and which belong incontestably to vegetables which are parasitic upon them. The reasons which M. Pringsheim brings against this appreciation ought to have lost some of their value in consequence of the new observations which have been made on the biology of microscopic parasites, and the whole subject should be studied again. More ample details concerning the sexual organs of the *Saprolegnia* will be found in the already quoted works of this celebrated Algalogist.

The oospores of the *Saprolegnia*, when they have arrived at their maturity, possess, like many other spores, a tolerably thick integument, which is double, viz., formed of an epispore and an endospore. After a considerable time of repose, they originate tubular or vesicular germs, and, by exception, these germs are only as yet slightly elongated, when they produce zoospores.

Hitherto it has not been possible to obtain a direct experimental proof of the reality of a fecundation in the *Saprolegnia*, unless we can consider as such an instance observed by M. Pringsheim, in which the multitude of the gonospheres of a *Saprolegnia* perished

totally from the accidental default of antheridia. However, if we consider the analogies of all kinds which exist between the organs of the *Saprolegniæ* and those among the Algæ, of which the sexual office is well known, we cannot refuse to the former the value which we grant to the latter. Experimental researches on the phenomena of sexual multiplication in the other Fungi, and on the organs which are employed in it, are barely possible. The physiological office of these latter, as sexual organs, can only be concluded from the constancy of their reciprocity of action, and from their resemblance to the organs of *Saprolegniæ*.

TWO SPECIES OF PEZIZA.*

By WORTHINGTON G. SMITH, F.L.S.

Peziza (Humaria) Chateri. Sm. "Chater's Peziza."

Cups concave, at length expanded, margin incurved, sessile, bright orange-red within, pale brown externally, from the colour of the cells of the cup, asci cylindrical; sporidia elliptic, binucleate, epis-pore rough. Paraphyses clavate above.—*W. G. Smith, in Gard. Chron.*, No. 1 (1872). *with fig. Rabh. Fung. Eur.*, No. 1517.

On the ground.

Cups 1 to 6 lines across, composed of clavate, pale brown, septate cells, the tips of which give a granulated appearance to the outer surface, which is otherwise smooth.

(Pl. VIII., fig. 1. 2.)

Peziza (Mollisia) Bullii. Sm. "Bull's Peziza."

Cups subhemispherical, at length irregular, sessile, or very shortly stipitate, whitish, margin inflexed, rather pulverulent from the remains of the veil, hymenium often proliferous, mycelium brownish, asci subclavate, sporidia sub-elliptic, minute.—*W. G. Smith, in Gard. Chron.*, (1873). *with fig. B. & Br. Ann. N. H.*, No. 1324, t. 19, f. 17.

On a wooden cistern. Dec.

Sporidia .0002-.0003 in. long.

(Pl. VIII., fig. 3.)

* For the use of the figures illustrating this communication, we are indebted to the *Gardener's Chronicle*.

BATARREA PHALLOIDES.

Mr. W. G. Smith has announced in the *Gardener's Chronicle* that four specimens of this very rare and interesting fungus have been found recently in Britain. One of these has been deposited in the Museum of the Royal Botanic Gardens, at Kew.

FIG. 1.

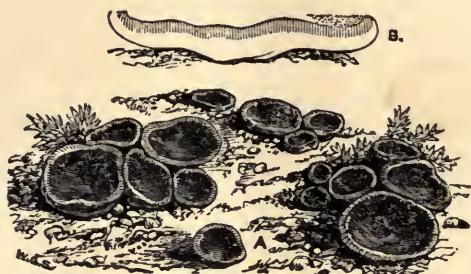


FIG. 2.

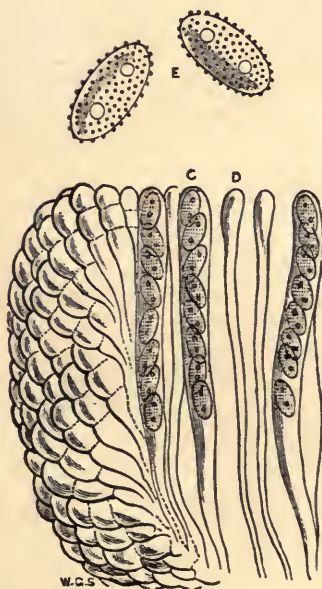
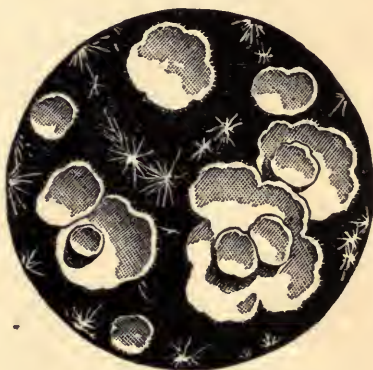


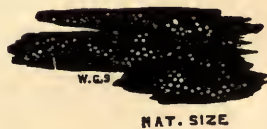
FIG. 3.



X 30 DIA



X 700 DIA.



FIGS. 1, 2, PEZIZA CHATERI Sm.
 „ 3, PEZIZA BULLII Sm.

LICHENOLOGICAL MEMORABILIA.—No. 3.

By the REV. W. A. LEIGHTON, B.A., F.L.S., F.B.S., Ed.

Hellbom's Lichens of Lule Lapmark.

Messrs. P. J. & E. V. M. Hellbom, of Orebro, Sweden, have issued a "Centuria" of dried specimens of Lichens, collected by them in 1871, in Lule Lapmark. Unfortunately, though with printed labels, they are not numbered, so that it will be difficult to quote them as Exsiccati. For convenience sake I have numbered them in the following notes. They appear to be named after Th. M. Fries *Lichenes Arctoi*, but I have transposed them into the nomenclature adopted in Dr. W. Nylander's system, as that which is best known and most used in Britain. The specimens, in general, are good and characteristic, and comprise many rare and newly-detected lichens. Amongst them are many species which occur also in Britain, and the whole collection is interesting not only to the general lichenist, but also to the British lichenist, inasmuch as it identifies our insular species with those of more northern continental countries, and also enables us to detect several which have not heretofore been recorded as British. The following notes made during examination and identification, before placing them in my herbarium, may prove of some value and interest:—

1. "**Pyrenopsis granatina**. (SMRFLT.)—In rupibus micaceo schistosis infra Snjärarak Lapponiæ Lulensis" = Fellm. Exs. Lapp. Or. 4. Leight. Lich. Fl. G. B. 14.

2. "**Phylliscum endocarpoides**. NYL.—In rupibus ad Aktse & Qvickjock." = Nyl. Syn. p. 137., t. 3, f. 6. Wahl. Fl. Lapp., t. 29, f. 2. Fellm. 3. Sommerf. 58. Körber, 270.

3. "**Bæomyces roseus**. PERS.—In terra infra alpem Rittok." = Leight. Lich. Fl. G. B. 53 & Exs., cited there, to which add Sommerf. 156. Reich. & Schub. 16.

4. "**Sphyridium placophyllum**. (WNBG.)—Ad terram in alpe Snjärarak." = *Bæomyces placophyllus*, ACH. Leight. Lich. Fl. G. B. 53.

5. "**Icmadophila æruginosa**. (SCOP.)—In terra humida ad Aktse." = *Bæomyces icmadophilus* (EHRH.) Leight. Lich. Fl. G. B. 54, & Exs., there cited, to which add Reich. & Schub. 27.

6. "**Helocarpon crassipes**. TH. FR.—Ad terram turfosam in summo cacumine alpis Nammats." A lichen with the aspect of a *Lecidea* with conglomerate apothecia, but belonging to the tribe *Bæomycei*. See Th. M. Fries. *Lich. Arctoi*, 178. K—C—

7. "**Cladonia botrytes**. (HAG.)—Ad truncos mortuos abietis prope Aktse" = Fries. 80. Fellm. 36. Körb. 242. Rabh. 817. Mass. 182. K—C yellow.

8. "**Cladonia amaurocræa**. FLKE.—In rupibus muscosis infra Snjærrak & in Pakti Suollo ad Qvickjock." Small specimens (K. f. + C. +). Leight. Lich. Fl. G. B., 74.

9. "**Pilophorus cereolus**. (ACH.) **P. Fibula**. TUCKERM.—In schistomicaceo ad Qvickjock et amphibolitico ad Jockmock." = *Pilophoron fibula*, TUCK. Leight. Lich. Fl. G. B., 76.

10. "**Thamnolia vermicularis**. (SW.)—In terra nuda campi alpini Walliware prope Qvickjock." = Leight. Lich. Fl. G. B. 82, and Exs., cited there.

11. "**Usnea barbata**. (L.)—In ramis abietis ad Qvickjock." Specimens without fructification, forma *hirta*, Fr. Leight. Lich. Fl. G. B. 84; Schær. Exs., 399; Mudd., 35; Anzi. It. S., 16; Hepp., 828; Leight., 1; Spruce Amaz., 50.

12. "**Bryopogon jubatus**. (L.), c. fr.—Ad ramulos abietis prope Qvickjock." = *Alectoria jubata*, ACH. Leight. Lich. Fl. G. B., 88.

13. "**Bryopogon Fremontii**. TUCKERM.—Ad truncos ramosque pinuum prope Jockmock." = *Alectoria Fremontii*, TUCKERM. Suppl. I, p. 422. Conspicuous by the greenish-yellow pruina of the apothecium (K—C—).

14. "**Alectoria ochroleuca** (ENRH.) α **rigida** (VILL.)—In rupibus campisque alpinis prope Aktse." K faint yellow, C full yellow. Leight. Lich. Fl. G. B., 87; Reich. Schub. 67; Fellm. 52; Schær. 395. No fructification. Hoffm. Pl. Lich. t. 26, f. 2.

15. "**Cornicularia divergens**. (ACH.)—Ad rupes Aktse Kallou prope Aktse." = *Alectoria divergens* (ACH). Thallus K—C—, medulla K—C reddish. No fructification. Small specimens = Sommerfelt Crypt. Norveg., 154.

16. "**Parmelia lanata**. (L.) WALLR.—Ad rupes campi alpini Tjackeli prope Aktse." Typical form, but somewhat approaching var. *parmelioides*, CROMB. (Journ. Bot., n. s., 1, p. 231.) E. Bot., t. 846, central fig. Hepp. 588; M. & N. 557; Schær. 257; Anzi., 53; Fellm. 82. This lichen must be removed to the genus *Alectoria*, and be named *A. lanata*, ACH.

17. "**Evernia divaricata**. (L.) ACH.—Ad ramulos abietis in promontorio Parkijaur Morka." Sterile; thallus K—C deep yellow. = Fellm. 55. Anzi. It. S. 72. Fries. 332. Mass. 22.

18. "**Ramalina calicaris** (L.) FR. β **fastigiata** * **minuscula** (NYL.) TH. FR.—In ramulis abietis ad Qvickjock." = *Ramalina minuscula*, NYL. Mon. Ramal. p. 66. Fellm. 57.

19. "**Cetraria odontella**. ACH.—Ad saxa muscosa campi alpini supra Aktse." Small and poor specimens, intermixed with *Cetraria aculeata*, FR.

20. "**Cetraria hiascens** (FR.) TH. FR. **Cetraria islandica**. Var. **Delisei** Bory.—In locis humidis inter rupes infra alpem Nammats." = *Cetraria Delisei* (SCHÆR.), medulla K—C red = Fellm. 60. Th. Fries, 54. Leight. Lichen. Fl. G. B. 97.

21. "**Cetraria cucullata.** (BELL.)—In rupibus muscosis infra Nam-mats." = *Platysma cucullatum* (BELL). Thallus K—C deep yellow. Leight. Lich. Fl. G. B., 99 & Exs., there cited; sterile, well distinguished by the *recurved* apices of the laciniae.

22. "**Cetraria nivalis.** (L.) Ach.—In rupibus muscosis infra Nam-mats." = *Platysma nivale* (L.), thallus K—C deep yellow. Leight. Lich. Fl. G. B., 99 & Exs., there cited, to which add Sommft. 76. Rabh. 865. Sterile; readily distinguished by the *erect* dentate apices of the laciniae.

23. "**Nephroma arcticum.** (L.)—In terra muscosa ad Aktse." K—C yellow. Back of receptacle minutely depresso-granulate; see Leight. Not. Lich., No. 31. = Reich. & Schub., 13. Rabh. 857. Fries. 4.

24. "**Nephroma expallidum** (NYL.)—In terra muscosa ad Aktse." Sterile specimens. = Fellm. 65, 66. See Leight. Not. Lich. 31.

25. "**Nephroma tomentosum.** (HOFFM.)—Ad Sorbum aucupariam et Salicem capream prope Aktse." = *Nephromium tomentosum*, HFFM. var. *rameum*, SCHÆR. See Leight. Not. Lich. 31, & Lich. Fl. G. B., 105.

26. "**Nephroma papyraceum.** (HOFFM.)—In rupibus muscosis ad Aktse & Qvickjock." Two specimens, one normal *Nephromium lævigatum*, Ach., the other var. *parile*, (ACH.) Med. white K—. Back of receptacle minutely depresso-granulate. Leight. Lich. Fl. G. B., 104.

27. "**Peltigera scabrosa.** Th. Fr.—In rupibus muscosis insulæ Pakti Suollo ad Qvickjock." = *Peltigera scutata*, (DICKS). Br. Crypt. 3, 18 (excl. syn.); Leight. Lich. Fl. G. B. 110 and Exs. there cited.

28. "**Solorina crocea.** (L.)—In terra ad Jockmock." = Leight. Lich. Fl. G. B., 112, and Exs. there cited.

29. "**Sticta linita.** ACH.—In terra muscosa ad Tjåmåtis & Aktse." Sterile = Fellm. 73; Anzi. Langob. 47; Schær. 385.

30. "**Sticta pulmonaria.** (L.)—Ad truncos Salicis capreae prope Aktse." = *Sticta pulmonacea*, ACH., sterile. Leight. Lich. Fl. G. B., 118, and Exs. there cited; to which add Sommerf., 151; Reichenb. and Schub., 134.

31. "**Sticta scrobiculata.** (SCOP.)—In cortice Salicis capreae ad Aktse." = *Stictina scrobiculata* (SCOP.). Leight. Lich. Fl. G. B. 117, and Exs. there cited, to which add Rabh. 837.

32. "**Parmelia alpicola.** Th. Fr.—In summis cacuminibus alpium Snjærrak, Walli & Njåmmelst prope Qvickjock" = *Parmelia physodes* var. *discreta*, NYL. Leight. Lich. Fl., 127. Medulla white, K—C—.

33. "**Parmelia encausta.** (SM.)—In rupibus campi alpini ad Aktse" = *Parmelia physodes* (L.) var. *encausta*, (SM.). Leight. Lich. Fl. G. B., p. 127, and Exs. there cited.

34. "**Parmelia hyperopta**. ACH.—In truncis mortuis ad Aktse." This is *P. aleurites*, ACH.; see Nyl. in Flora, 1872, p. 248. What British lichenists have heretofore regarded as *P. aleurites* is now to be considered *Platysma diffusum*, WEBB. Spic. Fl. Gotting., 250 (see Nyl. l. c.), and E. Bot. t. 858; and Dicks. Crypt. 3, 17, t. 9, f. 6, must be quoted to it.

35. "**Xanthoria lychnea** (ACH.) Th. Fr.—Ad corticem abietis prope Aktse." = *Physcia parietina* (L.) var. *lychnea* (ACH.). Leight Lich. Fl., 143, and Exs. there cited.

36. "**Gyrophora hyperborea**. ACH.—In rupibus ad Aktse." = *Umbilicaria hyperborea*, (ACH.). Leight. Brit. Umbil., 10, and Lich. Fl. G. B., 157, and Exs. there cited, and Hoffm. Pl. Lich., t. 71.

37. "**Gyrophora erosa**. (WEB.)—In rupibus infra alpem Njämmeelst." Very beautiful and delicate specimens of *Umbilicaria erosa*, (WEB.). Leight. Brit. Umbil., 12, and Lich. Fl. G. B., 158, and Exs. there cited.

38. "**Gyrophora vellea**. L.—Ad rupes prope Aktse." Sterile. = *Umbilicaria vellea*, Nyl. Scand., 114.; Fellm., 89. "Apothecia circinato-plicata."

39. "**Gyrophora spodochoa**. (EHRH.) Ach.—In præruptis alpium Tjackeli & Nammata." Fertile. = *Umbil. spodochoa* HFFM. Nyl. Scand., 115; disk of apothecia plane, with a thick margin and a central papilla or wart.

40. "**Gyrophora proboscidea**. (L.)—Ad rupes prope Aktse." Fertile. = *Umbil. proboscidea*, (ACH.) Leight. Lich. Fl. G. B., 160, *deusta*, Leight. Br. Umbil. 17, 18, 19.

41. "**Gyrophora cylindrica**. (L.)—In rupibus ad flumen Kama-jok prope Qvickjock." Fertile. = *Umbil. cylindrica*, Leight. Lich. Fl. G. B., 161. *U. proboscidea*, Leight. Br. Umbil., 19.

42. "**Gyrophora anthracina**. (WULF.)—In alpe Tjackeli." Fertile. = *Umbil. atropurpurea*. Nyl. Scand. 113. Schær. Exs. 155. Hepp. 721. Th. Fries. 38. *U. anthracina*, β tessellata, Schær. in Ser. Mus. Helv., 1, t. 13.

43. "**Pannaria hypnorum**. (VAHL.)—Inter muscos l. in terra subnuda ad Aktse." = *Psoroma hypnorum*, (VAHL.) Leight. Lich. Fl. G. B., 163 & Exs. there cited, to which add Fellm. 94. Reich. & Schub. 103.

44. "**Pannaria elæina**. (WNBG.)—In alpe Nummats prope Aktse." This is the true plant of Whlnbg. Fl. Lapp. 425, t. 28, f. 3. The plant of E. Bot. 2158, and Leight. Lich. Fl. G. B. 165, is most probably *Physcia adglutinata*, (FLK.). Leight. l. c. 149.

45. "**Pannaria brunnea**. (SW.)—In terra muscosa l. subnuda ad Aktse. = *Pannaria pezizoides*, (WEB.) Precisely the plant of Fellm. 96.

46. "**Placodium chrysoleucum**. (SM.) Ach.—In præruptis parietibus alpis Rittok." = *Squamaria chrysoleuca* (SM.) Status margine squamarum atque pagina infera nigricantibus = Reich. & Schub. 36. K yellow, C orange-yellow.

47. "**Xanthoria elegans**. LINK.—In schisto micaceo ad Qvickjock." Under this name three specimens are given, two of which have the surface of the thallus minutely punctellato-impressed, and are therefore referable to *Placodium murorum*, (HFFM.), var. *miniaturum*, (HFFM.), and Leight. Lich. Fl. G. B. 175; and the third is the true *Placodium elegans*, (LINK.). Leight. l. c., 178. It is questionable whether *miniaturum* should not be distinguished as a distinct species, since it has nothing in common with *Pl. murorum*, with which it is usually associated.

48. "**Caloplaca jungermanniæ**. (VAHL.)—In terra supra muscos ad Aktse" = *Lecidea fusco-lutea* var. *convexa*, Schær. Herb. !! *Placodium lividum*, Hepp. 403, Anzi. Langob. 95. Not *Lecanora fulvo-lutea*, Nyl. Scand. 146.

49. "**Dimelæna oreina**. (ACH.)—In alpibus Nunnats et Rittok prope Aktse." K faint yellow, C deeper yellow, a poor specimen; thallo macriore ambitu parum effigurato, hypothallo nigro predominante = Hepp. 209. From there-action this will be *L. Mougeotoides*, Nyl. see Flora, 1872, p. 364 & 427. True *L. oreina*, Ach. has K =.

50. "**Rinodina mniaroea**. (ACH.)—Supra muscos ad Aktse & Qvickjock" = *Lecanora mniaræa*, Ach. Th. Fries. Lich. Arct., 127. Anzi. Lich. Ital. S., 219.

51. "**Rinodina mniaroea** (ACH.) β **cinnamomea**. TH. Fr.—In saxis calcareis muscosis ad Aktse" = Th. Fries. Lich. Arct., 128.; Anzi. Lich. Ital. S., 220.

52. "**Placodium melanaspis**. Ach.—Ad lapides inundatos fluminis Tarrajock prope Njungis" = *Lecanora alphoplaca* (WHLNB). Nyl. Scand., 152.

53. "**Aspicilia cinereorufescens**. (ACH.)—In saxis ad Aktse & Qvickjock." This specimen has re-action, K yellow then red, and is, therefore, not *Lecanora cinereorufescens*, (ACH.), which has K—C—. Judging from the black colour of the somewhat pruinose epithecium it should be referred to *Lecanora Myrini*, (FR.). Th. Fries. Lich. Scand., 283, states how *L. Myrini* (FR.) and *L. alpina* SMRFT. may be distinguished, the former having a black naked or pruinose epithecium, and the latter a rufous or rufous-black epithecium, especially visible when moistened, but remarks that they may be possibly only states or varieties of the same lichen. With these criteria Richardson Arct. Am., 124, Zeo., 4, should represent *L. Myrini* (FR.), of which I possess a specimen under a different name, without locality, but probably British, from Rev. T. Salwey. *L. alpina* (SMRFT.) will then be represented in Exs. by Arnold, 341, and 341 b., and 116, Schær. 130; and I possess it from Cader Idris, and from Noirmont, Jersey.

54. "**Aspicilia Myrini** (FR.) TH. FR.—In saxis campi alpini supra Aktse." See note on "*Aspicilia cinereorufescens*."

55. "**Aspicilia pelobotrya**. (WNBG.)—In alpe Walliware prope Qvickjock." This is not identical with *Lecidea pelobotrya* (WHLNB.) of Leight. Lich. Fl., 298 ; but has an areolate thallus and convex or granular areolæ, with tuberculose reddish cephalodia and re-action, K faint yellow, C red, consequently = *L. panæola*, Ach. Leight. Lich. Fl., 280, and Exs. there cited, to which add Smrft. Norveg., 51.

56. "**Lecanora pallescens**. (L.)—In cortice Salicis capreæ & Sorb. aucupariæ ad Aktse." In this specimen the disk of the apothecium alone has re-action K yellow and C becoming red ; it is, therefore, referable to *Lecanora parella* (L.) *forma pallescens* (L.). Leight. Lich. Fl. G. B., 189.

57. "**Lecanora catellea** (ACH.) NYL.—In cortice alni infra Snjær-rak." Very like *Lecanora subfusca* f. *argentata*, Ach.

58. "**Lecanora frustulosa**. (DICKS.)—In locis præruptis alpis Njammats prope Qvickjock." This specimen is not identical with Dickson's *frustulosa*, but is in reality *L. argopholis* (WHLNB.). Leight. Lich. Fl. G. B., 196.

59. "**Lecanora rhypariza**. NYL.—In præruptis muscosis alpis Nammats."

60. "**Biatora curvescens**. MUDD.—In præruptis muscosis alpis Nammats."

61. "**Biatora castanea**. HEPP.—Ad terram muscosam in alpe Nammats." 59, 60, and 61 are all states of the same lichen.

62. "**Acarospora chlorophana**. (WNBG.)—In alpibus Tjackeli & Skærfi prope Aktse." A miserable specimen of the sterile scattered thallus of *Lecanora chlorophana* (WHLNB.). Perfect specimens in fruit will be found in Schær. 336 ; Hepp. 770 ; Anzi. Langob. 68 ; Anzi. Ital. Sup. 214. K—C—.

63. "**Acarospora badiofusca**. (NYL.)—Ad saxum erraticum micaceo schistosum prope Qvickjock." = *Lecanora badiofusca* (NYL.) Scand. 174. Similar in structure and in numerous minute spores with *Lecanora cervina* (PERS.), and of which it may be possibly a state. K—C—.

64. "**Lecanora albescens** (HOFFM.) TH. FR. * **dispersa** (PERS.) FLKE.—Ad saxa micaceo-schistosa prope Qvickjock." = *Lecanora galactina* (ACH.), *forma dispersa* (PERS.). Leight. Lich. Fl. G. B., 206.

65. "**Lecidea Dicksoni**, ACH. **L. melanophæa**, FR.—In alpibus Nammats and Njammelst." Leight. Lich. Fl., 211, and Exs. there cited.

66. "**Biatorina nivalis**, (KÖRB.) **Gyalolechia**, MASS.—In rupibus muscosis alpis Nammats." = *Lecanora nivalis* (KÖRB.). Leight. Lich. Fl. G. B., 226.

CRITICAL NOTES

ON MYCOLOGICAL ILLUSTRATIONS (W. G. SMITH), PART 2.

BY PROF. ELIAS FRIES.

- Pl. 25, f. 1. AG. OBTURATUS. *Fr.* Habit very different from *Ag. obturatus*, but possibly a small form.
- 25, f. 2. AG. MERDARIUS. *Fr.* Genuine, but a small form.
- 26, AG. PORRIGENS. *P.* Excellent.
- 27, CORT. ELATIOR. *Fr.* = *Cortinarius grallipes*. *Fr.* very different from *Cort. elatior*.
- 28, f. 1. HYGROPH. LIMACINUS. *Scop.* Good.
- 28, f. 2. HYGROPH. RUSSO-CORIACEUS. *B. & M.* Not a species of *Hygrophorus*, but most certainly *Agaricus (Clitocybe) ericetorum*. *Fr.* Epicr. p. 73. Monogr. p. 127.
- 29, f. 1. AG. ALBO-CYANEUS. *Desm.* Differing from *A. albo-cyaneus*, and appears to be a new species, which may be called *Ag. Worthingtoni*.
- 29, f. 2. AG. INUNCTUS. *Fr.* Most excellent.
- 30, AG. CONFLUENS. *P.*
- 31, AG. CLAVIPES. *P.* Gills should be less crowded.
- 32, AG. PORTENTOSUS. *Fr.* A beautiful figure. This form is intermediate between *Ag. sejunctus* and *Ag. portentosus*. (Monogr. p. 52.)
- 33, f. 1. AG. TAYLORI. *B.* Most excellent: allied to *Ag. medius*.
- 34, f. 1. AG. LACRYMABUNDUS. *Bull.*
- f. 2. AG. CANDOLLIANUS. *Fr.*
- 35, f. 1. AG. TERREII. *B. & Br.* Scarcely differing from *Ag. cinnabarinus* (Monogr. p. 29), the fourth sub-species of *Ag. granulatus*.
- 35, f. 2. AG. BADHAMI. *B. & Br.* An excellent species and figure.
- 36, AG. SUBINVOLUTUS. *Batsch.* Unknown to me.
- 37, f. 1. AG. GRACILIS. *Fr.* } Good.
- „ f. 2. AG. ATOMATUS. *Fr.* }
- 38, AG. EXIMIUS. *W. G. Sm.* Remarkable.
- 39, f. 1. AG. CANDICANS. *Fr.*
- „ f. 2. AG. INFUNDIBULIFORMIS. *Sch.* var. *membranaceus*. *Fr.*
- 40, AG. STRANGULATUS. *Fr.* Most noble!
- 41, f. 1. THELEPHORA FASTIDIOSA. *Fr.* } Figures most
- „ f. 2. THELEPHORA CARYOPHYLLEA. *Fr.* } excellent!
- 42, f. 1. AG. ELATUS. *Fr.*
- „ f. 2. AG. FASTIBILIS. *Fr.*
- 43, f. 1. BOLETUS PURPUREUS. *Fr.*
- „ f. 2. BOLETUS PARASITICUS. *Bull.*

- 44, f. 1. AG. CARNEUS. *Bull.* Manifestly a species of *Cli-
tochybe*, and without doubt a small form of *Ag. rivulosus*.
 „ f. 2. AG. TERREUS. *Schæff.* Right and good.
 45, f. 1. POLYPORUS RUTILANS. *Fr.*
 „ f. 2. POLYPORUS STEPHENSII. *B. & Br.*
 46, AG. MAJALIS. *Fr.* A new and distinct species,
 clearly different from *Ag. majalis*, which I would call *Ag.*
Saundersii.
 47, BOLETUS CYANESCENS. *Bull.* Without doubt, but
 the colour of the flesh not blue.
 48, f. 1. AG. PATULUS. *Fr.* } Right, but the colour darker
 „ f. 2. AG. ACERBUS. *Bull.* } than I have seen.

CRYPTOGAMIC LITERATURE.

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 contains M. Cornu, "Monograph of Saprolegniæ," part i. E. de G.
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Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY,
AND ITS LITERATURE.

BRITISH FUNGI.

By M. C. COOKE.

(Continued from p. 116.)

ASCOMYCETES.

Peziza (Humaria) hinnulea. B. & Br. "Brown Humaria."

Cup sessile, flexuose, marginate, bay-brown, between fleshy and waxy; sporidia globose, even with a large globose nucleus.—B. & Br. *Ann. N. H.*, No. 1320.*

On soil amongst grass. Powerscourt. Sept.

Sporidia ($\cdot 0006$ in.) $\cdot 015$ m.m. diameter.

Peziza (Humaria) schizospora. Phillips. "Phillips' Humaria."

Gregarious, sessile, urceolate then plane, red, becoming brown, externally pruinose; sporidia spherical, smooth, with a large nucleus, paraphyses filled with orange granules, clavate at the tips.—*Phillips in litt.*

On burnt or sandy ground. Shrewsbury. (W. Phillips.)

Sporidia ($\cdot 0004$ in.) $\cdot 01$ m.m. diameter, containing a single large nucleus, which escapes by rupture of the episore.

Allied to *P. Wrightii*.—B. & Br.

Peziza (Humaria) subhirsuta var. macrocystis.

Gregarious or scattered, cup shaped then flattened; margin entire, slightly elevated, externally brownish, smooth, or minutely granular; disc orange-red; asci cylindrical; sporidia elliptical, narrow; paraphyses clavate, filled with orange granules.

On burnt soil. Shrewsbury. (W. Phillips.)

The external cells of the cup are very large: cups 1-2 lines broad, sporidia $\cdot 0009 \times \cdot 0005$ in.

Peziza (Dasyscypha) citricolor. B. & Br. "Lemon-coloured Peziza."

Cups very shortly stipitate or sessile, between fleshy and waxy, turbinate, finely tomentose, lemon-coloured; sporidia fusiform, with

oleaginous granules; paraphyses linear.—*B. & Br. Ann. N. H.*, No. 1321, t. xix. f. 14.

On rotten wood. March.

Cups. $\cdot 0009$ in., sporidia ($\cdot 0008\text{--}\cdot 001 \times \cdot 0002\text{--}\cdot 00025$ in.) $\cdot 02\text{--}\cdot 025 \times \cdot 005\text{--}\cdot 006$ m.m. Asci ($\cdot 0035\text{--}\cdot 004$ in.) $\cdot 085\text{--}\cdot 1$ m.m. long.

Peziza (*Dasyascypha*) *stereicola*. *Cooke*. "Rose-pink *Peziza*."

Gregarious, minute; cups globose, then cup-shaped, between fleshy and waxy, externally woolly, of a delicate rosy-pink when dry; disc of the same colour; asci subclavate; sporidia minute, cylindrical, obtuse.

On the hymenium of *Stereum*. Scotland. (*Herb. Edin.*)

Sporidia ($\cdot 00025 \times \cdot 00005$ in.) $\cdot 007 \times \cdot 0015$ m.m.

Peziza (*Dasyascypha*) *candidata*. *Cooke*. "White Bramble *Peziza*."

Snowy white, sessile, soft, scattered or subgregarious, soon flattened; margin often lobed and irregular, slightly elevated, externally clothed with soft tomentose hairs; asci subclavate; sporidia minute, cylindrical, obtuse, hyaline.

On stems of *Rubus*. Highgate.

Sporidia ($\cdot 00025 \times \cdot 00005$ in.) $\cdot 007 \times \cdot 0015$ m.m.

Peziza (*Dasyascypha*) *escharodes*. *B. & Br.* "Grey Bramble *Peziza*."

Cups sessile, rugose, rough with short whitish flocci, dingy olivaceous-green; margin pallid, fringed with delicate flocci; hymenium cinereous; sporidia fusiform, sometimes binucleate.—*B. & Br. Ann. N. H.*, No. 1322, t. xix. f. 15. *Cooke exs.* No. 564.

On *Rubus fruticosus*. Feb.

Sporidia ($\cdot 0004$ in.) $\cdot 01$ m.m. long. Cup at first closed, globose, $\cdot 03$ in. diameter, quite black when the hairs have vanished.

Peziza (*Hymenoscypha*) *amentii*. *Batsch*. "Catkin *Peziza*."

Delicate, whitish; cups scattered, slightly convex, with the margin inflexed, watery, pellucid, at length brownish; stem short, thickened upwards; sporidia obovate.—*Batsch. El. f.* 148. *Fr. Sys. Myc.* ii. 127. *B. & Br. Ann. N. H.*, No. 1323, t. xix. f. 16. *Fekl. exs.* No. 1159.

On female catkins of *Abele*. March.

Sporidia ($\cdot 0004 \times \cdot 0002$ in.) $\cdot 01 \times \cdot 005$ m.m.

Peziza (*Mollisia*) *elaphines*. *B. & Br.* "Granular *Peziza*."

Cups subglobose, pale fawn-colour; mouth paler, white, sprinkled with saccharine granules; hymenium watery-grey; sporidia fusiform, hyaline, smooth, uniseriate.—*B. & Br. Ann. N. H.*, No. 1325, t. xix. f. 18.

On dead wood. Jan.

Granules often disposed in lines so that the cups are radiated. Asci $\cdot 0015$ in. long; sporidia fusiform ($\cdot 00035\text{--}\cdot 0004$ in.) $\cdot 0085\text{--}\cdot 01$ m.m. long.

Peziza (*Mollisia*) *aquosa*. *B. & Br.* "Watery *Peziza*."

Cups at first closed, then expanded, plane, or slightly concave, greenish-brown, smooth; disc watery-grey; sporidia biseriate, ovate, apiculate.—*Berk. & Br. Ann. Nat. Hist.*, No. 1326, t. xx. f. 19.

On or with *Sphæria hirsuta* on willow. Jan.

Resembling *P. cinerea*, but smoother and more concave when young, with totally different fruit. Cup $\cdot 024$ in. diameter, growing on *Sphæria hirsuta* and its mycelium, accompanied by a brown mould, consisting of erect, simple, articulated threads, surmounted by a single oblong, uniseptate spore $\cdot 0005$ in. long; asci ($\cdot 002$ in.) $\cdot 05$ m.m. long; sporidia ($\cdot 0002\text{--}\cdot 00025 \times \cdot 0001\text{--}\cdot 00015$ in.) $\cdot 005\text{--}\cdot 006 \times \cdot 0025\text{--}\cdot 0035$ m.m., bright orange when treated with iodine.

Peziza (Mollisia) hydnicola. *B. & Br.* "Green Parasitic Peziza."

Cups orbicular, then irregular, plane, dark green; asci cylindrical; sporidia subglobose, uniseriate; paraphyses branched. *Berk. & Br., Ann. Nat. Hist., No. 1327, t. xx. f. 20.*

On *Hydnum ochraceum*.

Sporidia ($\cdot 0004 \times \cdot 0003$ in.) $\cdot 01 \times \cdot 0075$ m.m. Conidia ($\cdot 0001\text{--}\cdot 00015$ in.), $\cdot 0025 \times \cdot 0035$ m.m. long.

Peziza (Mollisia) flaveola. *Cooke.* "Yellow Fern Peziza."

Sessile, minute, bright yellow, submembranaceous; soft, soon becoming discoid, smooth, even. Asci cylindrical.

On fronds of *Pteris aquilina*. Sept. King's Lynn. (C. B. Plowright.)

A very pretty little species, but apparently very scarce, and the specimen found was not sufficiently matured for a perfect description.

Peziza (Mollisia) Typhæ. *Cooke.* "Bulrush Peziza."

Gregarious or scattered, minute, erumpent, sessile, black, soft or waxy, soon plane, laterally compressed when dry; disc fuliginous, black when dry, minutely papillate, even; asci cylindrical, sporidia fusiform, hyaline simple. *Cooke, Exs., No. 570.*

On leaves of *Typha*. King's Lynn. (C. B. Plowright.) Oct.

Sporidia ($\cdot 0004\text{--}\cdot 0005 \times \cdot 0001$ in.), $\cdot 012\text{--}\cdot 014 \times \cdot 0025\text{--}\cdot 003$ m.m., twice as long as in *Peziza atrata*, to which this plant has great external resemblance.

Peziza (Mollisia) Plantaginis. *Fckl.* "Plantain Leaf Peziza."

Cups seated on a pallid spot, sessile, gregarious, minute, punctiform, at first closed, globose, at length open, externally clad with a blackish meal; margin involute, disc concave, pallid-brown; asci elliptic-oblong, sporidia biseriate, elongated-lanceolate, straight. *Fckl. Sym. Myc., 294. Peziza atrata forma foliicola, Desm. Exs.*

On leaves of *Plantago lanceolata*. King's Lynn. (C. B. Plowright.)

Sporidia ($\cdot 0005 \times \cdot 00015$ in.), $\cdot 016 \times \cdot 004$ m.m.

Peziza (Mollisia) incarnata. *Cooke.* "Rosy fir-leaf Peziza."

Scattered, minute, roseate, sessile, cups soon expanded, nearly plane, externally paler; asci cylindrical, sporidia linear, obtuse, hyaline.

On pine leaves. Scotland. (A. Jerdon.)

Sporidia ($\cdot 0004 \times \cdot 00005$ in.), $\cdot 01 \times \cdot 0015$ m.m.

Peziza (Patellea) artemisiæ. *Lasch.* "Mugwort Peziza."

Erumpent, thin, almost stipitate; cups at first top-shaped, then

flattened, somewhat rounded, naked, brownish-black; disc whitish; margin incurved. Asci cylindrical; sporidia linear, minute, hyaline.—*Lasch. in Rabh. Herb. Myc. No. 335.*

On stems of *Artemisia vulgaris*. Isle of Wight.

Peziza (*Patellea*) *amphibola*. *Nyl.* "Lichenoid *Peziza*."

Cups black, somewhat rugulose, becoming plane, delicately marginate, or at length rather convex and immarginate; asci clavato-cylindrical; sporidia fusiform, 3-5 septate; paraphyses slender, simple or branched, slightly incrassated at the tips.—*Nyl. Obs. p. 66. Hepp. Flecht. Eur. No. 711. Karsten Mon. Pez. 168.*

On bark of *Pinus sylvestris*. (Dr. Holl and W. Phillips.)

Sporidia ($\cdot 0005\text{--}\cdot 0007 \times \cdot 0001\text{--}\cdot 00015$ in.) $\cdot 014\text{--}\cdot 02 \times 003\text{--}004$ m.m.

***Ascobolus* (*Ryparobius*) *Cookei*.** *Boud.* "Cooke's *Ascobolus*."

Much crowded, rarely scattered, very minute, externally brown, hemispherical; disc pallid, tawny, marginate; asci broad, short, somewhat attenuated at the base; sporidia 64, oblong-ovate, minute, hyaline; paraphyses few, septate, slightly incrassated.—*Boud. Mon. Asc. p. 48, t. 9, f. 24. Ascobolus Cookei, Crouan Flor. Finist. p. 56. Ascobolus myriadeus, Karst. Syn. Pez. & Asc. fide Nyl.*

On dung (cow, rabbit, &c.). Herefordshire. (J. Renny.) Near London. (M. C. C.) Near Bath. (C. E. B.)

***Ascobolus* (*Ascophanus*) *aurora*.** *Crouan.* "Glowing *Ascobolus*."

Scattered, minute, orange-red, shining, flattened; disc plane, or convex when old, distinctly papillate; asci clavate, octosporous; sporidia ovate, small, even; paraphyses orange, slender, simple, bifid, or trifid, curved.—*Crouan Ann. des Sci. Nat. ser. 5, x. t. 11, f. 36. Berk. & Br. Ann. Nat. Hist., No. 1329. Boud. Mon. Asc. p. 58, t. 11, f. 36.*

On cow dung. Feb.

Sporidia ($\cdot 00015\text{--}\cdot 0003$ in.) $\cdot 0035\text{--}\cdot 007$ m.m.

***Stictis graminum*.** *Desm.* "Grass *Stictis*."

Orbicular, scattered, small, deeply excavated; disc black; margin prominent, clad with a white meal, nearly entire; asci elongated; sporidia [very minute, globose].—*Desm. Pl. Crypt. Exs. No. 1071. Ann. des. Sci. Nat. (1840) xiii. 185. Berk. & Br. Ann. Nat. Hist., No. 1328. Fckl. Exs. No. 1106. Fckl. Sym. Myc. p. 250.*

On *Carex paniculata*. June.

Desmazieres describes the sporidia as "very minute, globose." Fuckel as "filiform, as long as the ascus." Not having seen the British plant, we cannot determine the form of the sporidia.

***Patellaria constipata*.** *Blox.* Handbook No. 2176.

This appears from comparison of authentic specimens of both to be only *Patellaria livida*, B. & Br., with the sporidia more fully matured.

LICHENOLOGICAL MEMORABILIA.—No. 3.

By the REV. W. A. LEIGHTON, B.A., F.L.S., F.B.S., Ed.

Hellbom's Lichens of Lule Lapmark.

(Continued from p. 126.)

67. "**Lecanora oculata.** (DICKS.) **Pertusaria.** Th. Fr. Lich. Scand. p. 307.—In alpe Njunnats." = Leight. Lich. Fl. G. B. 200 & Exs. cited there.

68. "**Varicellaria rhodocarpa.** (KORB.)—Ad cortices betulæ juniperique prope Aktse." K—C. crimson. Th. Fries., 73. Nyl. Scand. t. 1, fig. 8.

69. "**Pertusaria Sommerfeltii.** (FLKE.) Fr.—Ad corticem Salicis capreæ prope Aktse." K—C—. = Hepp. 937.

70. "**Pertusaria panyrga.** (ACH.) Th. Fr.—Ad ramos abietis prope Qvickjock." Th. Fr. Lich. Scand., p. 308. (excl. Syn. Leight. & Mudd.) = *P. leucotera*, NYL. Fellm. 143.

71. "**Lecanora protuberans.** (SMRFLT.) **Pertusaria.** Th. Fr. Lich. Scand. p. 305. In cortice alni ad Aktse." A very singular looking lichen, with the external aspect of a *Lecanora*, but with spores of *Pertusaria*. = Fellm. 171, Smrft. 148.

72. "**Pertusaria bryontha.** (ACH.) Nyl.—In muscis destructis infra alpem Nammats." = Leight. Lich. Fl., G. B., 240. Th. Fr. 9, Fellm. 142., Arn. 108.

73. "**Psora atrorufa.** (DICKS.)—In alpe Nammats prope Aktse." = *Lecidea atrorufa* (Dicks.), Leight. Lich. Fl. 250, and Exs. there cited.

74. "**Lecidea arctica.** SMRFLT.—In rupibus muscosis alpis Njämnelst." = Leight. Lich. Fl. 273 and Exs. there cited, to which add Smrft. 49. K faint yellow, C yellow.

75. "**Lecidea aglæa.** SMRFLT.—In alpinis Rittok et Walli." A poor specimen, but probably the true plant.

76. "**Biatorella rivulosa.** (ACH.) β **mollis.** (WNBG.)—In rupibus infra alpem Nammats." *Lecidea mollis* = (Whlbn.) Leight. Lich. Fl. 277.

77. "**Toninia squalida.** (ACH.) In terra supra schistum argillaceum ad alpem Skärfi." = *Lecidea squalida*, Ach. Schær. 170., Hepp. 123, Anzi Langob. 138. K—C—

78. "**Thalloidima rimulosum.** TH. FR.—In saxibus muscosis infra Skärfi." Very like a starved specimen of *Lecidea vesicularis* (HOFFM.) but having a different hypothecium, ellipsoid, 1-septate spores, and reaction K—C—. Described in Th. Fries Lich. Arctoi. 174.

79. "**Lecidea impavida**. TH. FR.—In alpinis Njåmmelst et Nammats."—A very curious and distinct looking lichen, carefully characterized in Th. M. Fries "Lichenes Spitzbergenses," p. 42.

80. "**Lecidea perfidiosa**. NYL.—In rupibus muscosis infra Snjårrak." Nyl. Scand. 244. Probably the true plant, but state of specimen unsatisfactory for correct examination.

81. "**Sporastatia Morio** (RAM.) β **coracina** (SMRFLT).—In alpinis Nunnats & Passo prope Aktse." A poor specimen, externally resembling *Lecidea nitida*, SCHÆR. (K—C—), but polysporous, and according with Sommerfelt's description in his Suppl. Fl. Lapp., 142.

82. "**Buellia insignis**. (NÆG.)—In terra muscosa alpis Snjårrak = *Lecidea insignis* var. *muscorum*, (WULF.), Hepp. 40, Fellm. 201. Anzi Ital. Sup., 292. The var. *corticicola* KÖRB., is Hepp. 39, Anzi Ital. Sup., 297. Both vars. have reaction, K yellow C orange or orange-red. The spores are brown, 1-septate, and the hypothecium dark fuscous. I have the var. *corticicola* from Bomere Pool, Shropshire (1871), not as yet recorded as British.

83. "**Buellia Rittakensis**. HELLB.—In rupibus infra Rittok et Nammats." A very remarkable lichen, well described by M. Hellbom in Kongl. V. A. Fordh. 1866, p. 463. On a black hypothallus, the roundish, fuscobadious shining areolæ, plane or concave, with an elevated albopulverulent margin, are distantly and dispersedly scattered, and the larger black apothecia are sessile on the hypothallus. The hypothecium is very large and thick, nigro-fuscous, the hymenium very narrow, paraphyses coherent or indistinct, and spores 8, fuscous, very broadly and obtusely oblong or ellipsoid, 1-septate. Reaction K—C—

84. "**Rhexophiale coronata**. TH. FR.—In terra muscosa infra alpinis Nammats." Assuredly a very distinct and beautiful species, described in Th. M. Fries Lichenes Arctoi, p. 205, but I cannot see any particular reason why it should be removed from the genus *Lecidea* of Ach. & Nyl. into a new and separate genus. It is *Lecidea rhexoblephara*, Nyl. Scand. 240 and 293. Leight. Lich. Fl. 333.

85. "**Buellia coracina**. (HOFFM.)—In summo cacumine alpis Passo prope Aktse." Identical with Fellm. Lapp. Or. 193, and our British plant and *Lecidea coracina*, Ach. Leight. Lich. Fl. 307.

86. "**Rhizocarpon geographicum** β **alpicolum**. (WNBG.)—In rupibus infra Njåmmelst." This specimen has reaction K yellow then red, whereas in *L. alpicola* (SCHÆR.), the reaction is K—C—, according to Schær. 173, Hepp. 151, and specimens from Dr. Nylander. The spores are colourless in a young state, but brown 1-septate when mature. Can it be *L. alpestris*, Schær. En. 107?

87. "**Lopadium pezizoideum.** (ACH.)—Ad muscos infra alpem Nammats." = *Lecidea pezizoidea*, ACH. Leight. Lich. Fl. 348, & Exs. there cited, to which add Sommerfelt Norv. 43.

88. "**Biatora atrofusca.** HEPP.—Ad terram muscosam in alpe Snjærrak." Anzi Catal. Sondr. 77.

89. **Biatora phæostigma.** (KÖRB.)—In ramulis abietis ad Aktse." Korb. S. L. G. 199., Par. 157.

90. "**Biatora Tornoënsis.** (NYL.)—Ad ramulos abietis prope Aktse." = *Lecidea Tornoënsis*, Nyl., Fellm. Lapp. Or. 148.

91. "**Biatora fuscescens.** (SMRFLT.)—In cortice betulæ ad Tjämätis." = Nyl. Par. 133. Rabh. 833. Smrft. 44. Fellm. 168, 169, 170. Anzi 172, 173. Th. M. Fries, 68.

92. "**Biatora cinnabarina.** (SMRFLT.)—Ad corticem betulæ prope Aktse." = *Lecidea cinnabarina*, SMRFLT. Fellm. Lapp. Or. 147. Th. Fr. Scand. 17. Hepp. 485.

93. "**Biatorina cumulata.** (SMRFLT.)—Ad terram nudam alpis Nammats." = *Lecidea cumulata*, Smrft. Lapp. 157. Th. Fries. Scand. 44. K yellow then reddish.

94. "**Lecidea Diapensia.** TH. FR.—In campis alpinis Tjackeli & Walli." = Fellm. Lapp. Or. 149.

95. "**Lecidea alpestris.** SMRFLT. * **toninioides.** HELLB.—In campis alpinis Snjærrak, Walli & Nammats." A form of *Lecidea alpestris*, SMRFLT., with the granules of the thallus larger, more areolato-verrucose, and the apothecia conglomerate. K—C—. I possess a specimen collected by Mr. Crombie at Ben Mac Dhui, which may be referred to the typical form. (Schær. 195. Fellm. 161,) not yet recorded as British.

96. "**Normandina viridis.** (ACH.)—In terra turfosa rupibusque muscosis." = *Normandina latevirens*, TURN. & BORR. Leight. Lich. Fl. 408.

97. "**Endocarpon pulvinatum.** TH. FR.—In præruptis alpis Njammats prope Qvickjock." Th. M. Fries, Lich. Arctoi, 257. This Dr. Nylander considers as probably a variety of *Verrucaria pallida*, ACH., see Lich. Scand. 292.

98. "**Microglæna sphinctrinoides.** (NYL.)—In terra subnuda alpis Snjærrak." = *Verrucaria sphinctrinoides*, NYL. Scand. 277. Fellm. Lapp. Or. 218.

99. "**Staurothele clopima.** (WNBG.)—In præruptis alpis Njammats prope Qvickjock." = *Verrucaria umbrina*, WHLNB., see Leight. Lich. Fl. 453, and Exs. there cited.

100. "**Polyblastia scotinospora.** (NYL.)—In saxis infra alpes Nammats & Snjærrak." *Verrucaria scotinospora*, NYL. Scand. 270. Leight. Lich. Fl. 453.

NEW ASCOMYCETOUS FUNGI.

By WORTHINGTON G. SMITH, F.L.S.

Mitrula alba. W. G. Sm.

Head globose, even, white; stem stuffed, white; asci linear, sporidia lanceolate, hyaline, enucleate.

Amongst submerged leaves. East Budleigh, Budleigh Salterton (Cecil H. Sp. Perceval, Esq.) April, 1871.

Sporidia $\cdot 00065 \times \cdot 0012$ in. Differs entirely from *M. paludosa*, Fr., in colour, and especially in the globose head and stuffed stem.

[Plate 10, fig. 7., *Mitrula alba*, nat. size. Fig. 8 section. Fig. 9 asci and sporidia $\times 700$ dia.]

Peziza (Aleuria) isabellina. W. G. Sm.

Cups large, sessile, fleshy, subglobose, internally smooth, brownish yellow with a shade of red, externally paler, subpruinose; sporidia elliptic.

On decayed coniferous wood. King's Lynn, Norfolk. (Chas. B. Plowright, Esq.) April, 1871.

Cups 1-2 in. across; sporidia $\cdot 00056 \times \cdot 00034$ in. Allied to *P. macrocalyx* and *P. vesiculosa*, but entirely differs from both in colour, habit, and fruit.

[Plate 9, fig. 1, 2. *Peziza isabellina* nat. size. Fig. 3 section Fig. 4 asci and sporidia $\times 700$ dia.]

Peziza (Aleuria) undata. W. G. Sm.

Middle sized, fleshy, slightly concave, at length reflexed, generally corrugated, rooting, variable in colour, purple, buff, grey, yellowish, or pallid; sporidia elliptic.

On tree fern stems. Messrs. Veitch's nursery, Chelsea. May, 1870.

Cups $\frac{1}{2}$ - $\frac{3}{4}$ in. across; sporidia $\cdot 00023 \times \cdot 00018$ in. Allied to *P. purpurascens*, but differing in the sporidia, which, in the latter, are three times as long as broad; also allied to *P. viridaria*, *P. applanata*, *P. violacea*, and *P. fuliginea*, but differing from all.

[Plate 10, figs. 1, 2. *Peziza undata*, nat. size. Fig. 3 side view, Figs. 4, 5 sections. Fig. 6 sporidia $\times 700$ dia.]

BRITISH MOSSES.—At the moment of going to press we have received a copy of Mr. C. P. Hobkirk's "Synopsis of British Mosses," consisting of 196 pages of neatly printed letter-press, bound in cloth. Of its contents we have at present had no opportunity of forming an opinion, but, as the most recent authorities appear to have been consulted, we have no doubt that a closer acquaintance will be as satisfactory as the present casual one. Such a handy volume was much needed by British Bryologists.





PEZIZA (ALEURIA) UNDATA. W.Sm.



MITRULA ALBA. W.Sm.





ON REPRODUCTION IN FUNGI.

By M. L. R. TULASNE*

Assiduous observation, and the perfection with which microscopes are constructed, will have enabled the botanists of this age to determine that there are no really agamous plants, that is, without sex; at any rate they can, from the present time, suspect with foundation, that in all vegetables, no matter to what group they belong, there exist two distinct orders of reproductive organs, the relative value of which may be compared to that of the two sexes in animals. Until latterly, however, the Lichens and Fungi seemed to form exceptions to this law, for all the researches of phytologists could not discover in them that duality of organs which, after having been for so long the exclusive privilege of cotyledonous plants, has since been found to belong to nearly all cryptogams. I have applied all my efforts to make this anomaly disappear, and I wish I could flatter myself that I had worked efficaciously.

As regards the Lichens I have shown† that the thallus of the greater number of them conceals small globose organs, kinds of simple or multilocular conceptacles, provided with an ostiolum, which, at a certain period of their development, allow the escape of an incredible number of extremely fine linear corpuscles, straight or curved, such, in fact, that no resemblance usually exists between them and the real spores of the lichen. *Spermogonia* (antheridia, male flowers), entirely similar, or very analogous, are also observed in different tribes of Fungi.‡

The *Pyrenomyces*, to which I particularly devoted my first work, furnish many very fine examples, but very varied ones are also found amongst the *Discomycetes* to which I now wish specially to draw the attention of those botanists who are interested in the physiological and organographical history of Fungi.

Among the *Discomycetes* of an inferior order, I have already noticed the foliicolous *Rhytismæ*, the development of which begins in summer by the production, on a black spot of variable extent and form, of small pulviniform capsules (*spermogonia*), filled by a solid, conical kernel, quite covered by a hymenium, like that of *Cytispora*. Out of these capsules spreads a golden pulp, in which very slender corpuscles (*spermatia*) are mixed with an abundant mucilage; and it is only after the expulsion of this spermatic matter that the stroma of the fungus thickens around the sperma-

* Memoir read at the Meeting of the Académie des Sciences, 13 Dec., 1852, translated from "Comptes Rendus," xxxv., p. 841.

† See my first observations on the reproductive organs of Lichens, in "Comptes Rendus," 24th March, 1851, and my "Memoire pour servir à l'histoire organographique et phys. des Lichens," in "Ann. des Sci. Nat.," 3rd series, vol. xvii., p. 5.

‡ See my note on the reproductive apparatus of Fungi, in the "Comptes Rendus de l'Académie des Sciences" Meeting, of 31 March, 1851.

gonia to serve as a base for the lirellæ, that is to say, for the generative apparatus of the spores. These new organs take all the autumn and winter to gain their full size, and do not ripen their seeds until the early spring. The spermatia of *Rhytisma acerinum* are linear and short, those of *Rhytisma salicinum* are globular. We know that M. Lévillé considered as a fungus *sui generis* the apparatus which engenders these corpuscles, and that he gave it the name of *Melasmia*.

Several *Hysteria* certainly possess spermogonia, but they are generally rather easy to confound with productions foreign to the fungus; we ought, however, to recognise as those of *Hysterium Fraxini* the small lageniform, and very black bodies, which are so abundantly sprinkled over the area occupied by the lirellæ, and which no longer contain any spermatia long before the maturity of the spores. The spermogonia of *Hysterium commune*, like those of *Hysterium scirpinum* and *Hysterium rubi*, are small, depressed capsules, of a brilliant black, in which we find an innumerable quantity of atomic spermatia; they have hitherto been taken for species of *Leptostroma*.

The spermogonia of *Triblidium quercinum* imitate in their form and structure those of *Rhytisma*; they are produced fastened to the first rudiments of the lirellæ, and their debris remain near these during the whole period of their long vegetation. The spermatia are linear, straight, and about 0.65 m.m. long; the spores are also very slender, but of a much more considerable length.

In *Stictis ocellata*, a Pezizoid fungus which gives out a very decided odour of honey, a great number of the tubercles which ought to be transformed into cups do not pass into this perfect state until after having produced either linear and very short spermatia or stylospores; the latter are acrogenous, oblong, reproducing bodies, which are equal in volume to the spores of the endothecium. Some tubercles confine their fecundity to this gangliary generation, and remain pycnidia, pure, and simple, that is to say, organs analogous, as regards their office, to the conceptacles I have thus designated in the Lichens.*

I also consider as pycnidia the small unilocular capsules with thick walls, which are seen mixed with the cups of *Heterosphaeria patella*, and which are generated on very short basidia, lanceolate, arcuate stylospores. There also exist such relations between *Ceuthospora phacidiioides* and *Phacidium Ilicis* that the first ought to be considered the pycnidia or spermogonia of the second.

The spermogonia of *Tympanis conspersa* have a turbinate-oblong form, the hard consistence and black colour usual to the perithecia of the *Sphæriæ*, but their inner wall is tapestried with the same hymenium as the central kernel of the spermogonia of *Rhytisma*, that is to say, with slender branched filaments from which spring

* "Annales des Sci. Nat.," 3rd series, vol. xvii., p. 108.

innumerable spermatia. These corpuscles, enveloped as they are in mucilage, issue from their conceptacle under the form of a long tendril, and each of them, taken separately, is only $\cdot 003$ m.m. long. There is no appearance as if these spermatophorous appliances were ever transformed, as has been thought, into cyathiform organs provided with thecae. Such organs are habitually rarer in *Tympanis conspersa* than the spermogonia; they are especially developed around the sori formed by the latter, and an infinitude of extremely fine spores are observed in each theca.

The spermoginia of *Cenangium ligni* (Desm.), a fungus barely differing from the true *Peziza*, are very small punctiform perithecia easy to confound with the young cups, and the simple cavity of which encloses an infinitude of straight spermatia which are not more than $\cdot 0035$ in. long.

Other *Cenangia* offer commonly only pycnidia, and ascophorous cups. The pycnidia of *Cenangium fuliginosum* are a kind of not very regular and unilocular tubercles; they have a more symmetrical form in *Cenangium Ariae*, and *Cenangium Padi*, and also contain arched-lanceolate stylospores, from 15 to 20 thousandths of a millim. in length. Those of *Cenangium Cerasi* and *Cenangium Prunastri* are frequently narrow and elongated in the manner of tubes; they are joined at their bases, and their cavities communicate with each other; we find very large linear-lanceolate and flexuous stylospores. *Cenangium Ribis* possesses on the other hand globular substipitate pycnidia, agglomerated on a thick subiculum, and their compact mass is divided by a network of coloured partitions into a multitude of compartments in which innumerable ovoid, and very small stylospores take their rise.

The *Cenangium Fraxini* and *Cenangium Frangulæ* deserve a special mention, for they possess, more than their legitimate congeners do, spermatia. In the first these corpuscles, which are curved and about $\cdot 01$ mm. in length, are developed either in small special ovoid processes, or in the cavity of the pycnidia towards their orifice, but in the latter case they are perfectly distinguishable from the stylospores, which are similarly arched, but relatively very voluminous. The spermatia of *Cenangium Frangulæ* are straight, from three to five thousandths of a millim. long, and fill the orifice of some of the young cups, while they are still almost closed, and their hymenium seems to be formed of similar elements. On the other hand, the pycnidia of the same fungus, which resemble the perithecia of *Sphæria*, habitually produce no spermatia.

In several *Dermateæ* stylospores and spermatia co-exist. According to what takes place in the fungi already quoted, these two kinds of reproductive corpuscles are disseminated before the appearance of the ascophorous cups, but they are here generated together on a stroma, which has no proper tegument. This subiculum much resembles a *Tubercularia* in *Dermatea carpineæ*; it is less well defined, of less consistence, and sometimes locellate in *Dermatea*

coryli, *D. dissepta* and *D. amaena*, which are all kinds of small cæspitose and corticolous *Pezizæ*.

The *Bulgaria inquinans*, which, in the adult state, represents a very large, deep black *Peziza*, is in its extreme youth an obtuse tubercle, the whole mass of which is divided into ramified lobes, and of very irregular form. The extremities of these lobes become towards the surface of the tubercle recipients, from which escape, for some time, waves either of pure spermatia, or of spermatia mixed with stylospores. Both are ovoid, but the spermatia are rose-coloured, or colourless, and much smaller than the stylospores, which are as black as the spores of *Melanconium*.*

Quite a different organization is observed in *Bulgaria sarcoides*. The unequal and sometimes branched clavules which accompany its cups are covered throughout their superior part by a spermatophorous hymenium, and disseminate in very great abundance, straight, very slender corpuscles (spermatia). In the early period of their vegetation they are also covered with globular conidia. As these cæspitose clavules are not always joined to the perfect form of the *Bulgaria*, they have been hitherto taken for a distinct species of fungus of the group of the *Tremellinæ*. (*Tremella sarcoides*).

We know of the cohabitation on the dead stalks of nettles of *Peziza fusarioides* with *Dacrymyces Urticæ*, and the orange-red colour common to both. There is no doubt but that these two products belong, as several mycologists have already supposed, to one and the same species, of which the *Dacrymyces* represents the spermogonia state, and the *Peziza* the perfect form.

Another small *Peziza* which grows in autumn around Paris on the dead branches of different trees, and which I would call *Peziza benesuada*, on account of the instruction its study affords to the mycologist, offers in some of its cups instead of the ordinary paraphyses, which are linear, straight and simple, slender branched and flexuous filaments, from which spring in great quantity very fine spermatia. The cups thus gifted none the less contain numerous fertile thecæ, and can consequently be rigorously qualified as hermaphrodites. They are just in the same case as the perithecia of certain Lichens (*Verrucaria*), while in several species of *Pyrenomycetes*, such as *Polystigma rubrum*, *Isothea saligna*, and others, there is only a succession in the same recipient of spermatia and thecæ, the latter never coming except after the former.

* I was wrong in saying ("Ann. des Sci. Nat.," 3rd ser., xvii., p. 84, note 2,) that the small, imperfect, and scarcely coloured spores, which accompany the normal spores of *B. inquinans*, were unfit for germinating, for I have since found that these small spores germinate quite as well, and even more quickly than the others.

NEW BRITISH LICHENS.

Communicated by the REV. J. M. CROMBIE, M.A., F.L.S.

The following *new species* of Lichens, recently discovered in Great Britain, have been described by Dr. Nylander in the "Flora," January, 1873, pp. 17-23:—

1. ***Lecanora præpostera***. Nyl.—Thallus white, thin, sub-smooth, areolato-rimose, sub-fimbriated, and darkly limited at the circumference (K + yellow, and then cinnabarine-reddish); apothecia blackish, opaque, glauco-suffused or subdenudate, moderate, the thalline margin rugulose or subcrenate, spores 8 μ , ellipsoid, 0,009-14 m.m. long, 0,005-6 m.m. thick; paraphyses slender, epithecium yellowish; hymeneal gelatine, and especially the thecae bluish with iodine.

On basalt rocks, in Jersey (Larbalestier, 1872). Not unlike a variety of *Lecanora atrynea*, Ach., but sufficiently distinct by the smaller spores, the reaction of the thallus and the hymeneal gelatine, as also by the other characters as above.

2. ***Lecanora conioptia***. Nyl.—Thallus greyish-brown, indeterminate, moderate, unequal, rimoso-diffract; apothecia black, innate, at first slightly margined, at length somewhat convex and immarginate, white within; spores 8 μ , brownish-black, ellipsoid, 1-septate, 0,015-20 m.m. long, 0,008-10 m.m. thick, epithecium brown, paraphyses moderate, subarticulated, hypothecium colourless; hymeneal gelatine, bluish with iodine.

On gneissic maritime rocks on the coast of Kincardineshire (Crombie, August, 1872). Not unlike *Lecidea conioptis* in external appearance, but a true *Lecanora*. The spermatogones are frequent, black punctate, with arthrosterigmata, and slightly bacillar spermatia. In the same locality was also gathered very sparingly, *Lecanora diphryodes*. (Nyl., in "Flora," 1872, p. 353.)

3. ***Lecidea leucophæopsis***. Nyl.—Thallus white, consisting of small, rotundato-diffracted squamules, which are adnate and depressed in the centre, and either dispersed or contiguous (K + yellow); apothecia brownish-black, opaque, convex, concolorous within (the hymeneal stratum dark-greyish); spores 8 μ , colourless, fusiform, 3-5-septate, 0,024-34 m.m. long, 0,005-8 m.m. thick; paraphyses slender, not always very well discrete, epithecium and hypothecium yellowish-brown; hymeneal gelatine bluish, and the thecae wine-red with iodine.

On quartzose stones of a wall on Ben Lawers. (Crombie, August, 1872.) The thallus of this species is not very uncommon here and there on Ben Lawers, but it is very rarely seen in fruit. Between the squamules there usually occur the pulvinuli of *Sirosiphon saxicola*, Næg. Nylander observes that the present species recedes from all known species; but probably is to be systematically arranged near to *Lecidea sabuletorum*.

4. *Lecidea mesotropiza*. Nyl.—Thallus white, verrucose, moderate (K + yellow); apothecia black, convex, immarginate, bluish-grey within; spores 8 næ, colourless, ellipsoid, 0,011-12 m.m. long, 0,007 m.m. thick; paraphyses not very well discrete, epithecium dark greenish-blue; hymeneal gelatine bluish, the thecæ violet-coloured with iodine.

On schistose stones of an old wall on the hill of Ardo, near Aberdeen, very sparingly. (Crombie, August, 1872.) From *Lecidea mesotropoides*, its nearest ally, it differs amongst other characters by the verrucose thallus and the bluish epithecium. The apothecia are sometimes slightly pruinose.

HERBARIUM MYCOLOGICUM ŒCONOMICUM.

The first Fasciculus of this publication, comprising specimens of 50 species of those fungi which exert a baneful influence upon agriculture and horticulture; and also those which take part in the administration of household œconomy, has just been published by Baron Thuemen of Teplitz.

The aim of the editor has been to give ample and characteristic specimens, in order that the study of those species of fungi which are hurtful to our cultivated plants or forest trees, may be facilitated, as it is only in this way that we can hope to combat the ravages of our numerous enemies. Consequently the greater portion of this fasciculus consists of those species which have their abode upon living plants. Pucciniæ, Uredines, and Peronosporæ find several representatives.

Amongst the more interesting species contained in this fasciculus are, *Uredo sorghi* (Pers.), *Puccinia Helianthi* (Schw.), *P. maydis* (Pötsch.), *Ustilago destruens* (Schl.), *Uredo cichoracearum* (D.C.), var. *Endivæ*, *Phacidium medicaginis* (Lasch.), *Exoascus pruni* (Fckl.), *Septoria oleæ* (D. & M.), *Septoria Mori* (Lèv.) *Hysterium nervisequum* (D. C.), *Oidium lactis* (Fr.), *Saccharomyces, apiculatus* (Rees), and several others.

The specimens are very good in quality, and abundant in quantity, each species being enclosed in a separate paper wrapper, their examination is greatly facilitated. Upon the whole, the author, Baron Thuemen, must be congratulated for the eminently practical turn this publication gives to the study of Fungology.

CHARLES B. PLOWRIGHT.

POTATO DISEASE.—The time for the preparation of the prize essay, for which one hundred pounds has been offered, is now extended from March until the autumn, in order to give more opportunity for original investigation.

A PARASITE ON PEZIZA.

By THE EDITOR.

We have lately received from C. J. Muller, Esq., of Eastbourne, a very interesting specimen of a Sarcoscyphous *Peziza*, which appears to be *P. hemispherica*, Wigg. The surface of the hymenium is rough, with the projecting upper portions of semi-immersed, pale brownish perithecia, each of which is furnished at the mouth with a tuft of delicate, erect hairs. The perithecia are themselves membranaceous and translucent, sometimes wholly immersed in the hymenium, as if proceeding from the inferior stratum, and composed of hexagonal cells, with a brownish tint, so as to render them conspicuous amongst the surrounding hymenium. Many of the asci, and septate paraphyses of the *Peziza* are normally developed. These parasitic perithecia contain free lemon-shaped spores, reminding one of the sporidia of certain *sphærizæ* which occur on dung, as *S. stercoraria*, &c. The spores are dark-brown, and near $\cdot 001$ inch in length, but in no instance could we detect asci, or sterigmata, nor obtain any direct evidence of the mode in which the spores are produced in the perithecia. No perithecia were found with the spores in their early stage, and before acquiring colour, but in all instances they seemed to be matured and free in the perithecia. From these circumstances we have been led to regard the parasite as coniomycetous, although not agreeing with the characters of any genus of which we have any knowledge. It has been suggested that these perithecia are not truly parasitic, but that they are another form of fruit of the *Peziza*. Such is not impossible, but, from present experience, we are disposed to consider it as rather improbable, although the fact that the perithecia seem to originate from the lower cellular stratum would favour the conjecture. Under any circumstances, the specimens in question are of a very interesting character, and we have at once placed on record all the facts which have come to our knowledge, in the hope that by turning attention to the subject, other specimens may be found, and a more complete history elaborated for this rather anomalous production.

The whole of the features of this parasite seem to favour the supposition that it may be a species of *Melanospora*, but no asci having been found, it would be too great an assumption to place it in that genus until an examination of specimens in an earlier condition settle the question whether the spores are produced on peduncles, or whether they are at first enclosed in asci. No species of *Melanospora* has hitherto been recorded as occurring in Britain.

A NEW BRITISH RICCIA.

A very distinct and interesting species *R. sorocarpa*, Bischoff (Nov. Acta Ac. Nat. Cur. xvii. 2, p. 1053, t 71, f 11), was detected last spring by Mr. B. M. Watkins, growing at Great Doward Hill, between Ross and Monmouth. The plant grows in tolerable abundance on the top of a projecting limestone rock, overhanging the Wye, and about three hundred feet above that river, but barren specimens only have hitherto been found.

Riccia sorocarpa. *Bischoff in Nova Acta Acad. Nat. Cur. xvii. 2, p. 1053, t. 71, f. 11. Bischoff Krypt, fig. 2667. Gottsche Syn. Hep. p. 600.*

Riccia minima. *Leers. Flor. Herbom, p. 252.*

Fronds bifid or sub-dichotomously divided into linear laciniae, carinato-sulcate in the middle, slightly incrassated beneath, and of the same colour; lobes oblong, rather acute or obtuse, or retuse; margin plane, smooth; fruit aggregated, superior at the base of the laciniae, at length with a gaping fissure.

R. BRAITHWAITE, M.D.

CRYPTOGAMIC LITERATURE.

HAMPE, E. Musci novi Australiæ ex herb Mueller, in "Linnæa" for October, 1872.

MULLER, J. Lichenum species et varietates novæ, in "Flora," Dec., 1872.

WINTER, G. Notes on Rehm's Ascomycetes, in "Flora," Dec. 1872.

NYLANDER, W. Observata Lichenologica in Pyrenæis Orient., in "Flora," Dec., 1872.

ARNOLD, F. Lichens of the French Jura, in "Flora," Dec., 1872.

GEHEEB, A. Bryological Journey to Lapland, in "Hedwigia," for Dec., 1872.

LIMPRICHT, G. Supplement to Bryologia Silesiaca of Milde, in "Hedwigia," Dec., 1872.

JOHNSTON, C. The preparation of Diatomaceæ, in the "Lens," for Oct., 1872.

SMITH, H. L. The Bailey Collection of Diatomaceæ, in the Museum of the Boston Society of Natural History, in the "Lens," for Oct., 1872.

BRIGGS, S. A. Some of the Diatomaceæ of Upper Lake Huron and the Sault, in the "Lens," for Oct., 1872.

SMITH, W. G., on Cordiceps capitata, with figs., in "Gardeners' Chronicle" for Feb. 8, 1873., pp. 178.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY,
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By THE REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 102.)

201. **Irpex simbræformis.** *B. & C.*—Totus resupinatus immarginatus, dentibus è basi triangulari subulatis seriatis, No. 3762. Penns. Michener.

Effused, entirely resupinate, immarginate, pallid; teeth triangular at the base, subulate above, arranged in parallel lines. A very pretty species.

* **Irpex obliquus.** *Fr.*—No. 2323. *Car. Inf.* On Liquidambar. No. 1605, Rav.

202. **Irpex discolor.** *B. & C.*—Totus resupinatus; subiculo tenui albo, cito poroso; dentibus fasciculatis compressis subulatis. No. 2939.

Entirely resupinate; subiculum thin, white, soon porous; hymenium umber, teeth fasciculate, subulate.

* **Radulum orbiculare.** *Fr.*—On Nyssa. Rav. No. 1765. No. 4372. Penns. Michener. On Cerasus.

* **R. magnoliæ.** *B. & C.*—Hook. Kew Misc. i., p. 236. Totum resupinatum, hic læve ceraceum, carneo-ochraceum, illic crassum e dentibus cylindricis obtusis connatis stalactitiis. No. 1097. *Car. Inf.*

On the smooth bark of *Magnolia glauca*. Effused, in part thin, bright ochraceous, with a smooth hymenium, with no distinct border; in part thick; composed of irregular cylindrical teeth, which are more or less connate.

203. **Radulum pallidum.** *B. & C.*—Totum resupinatum, læve ochraceum; margine superiore tomentoso; dentibus brevibus cylindricis sparsis. No. 2599. *Car. Inf.*

On bark of *Carya*. Forming oblong patches, the upper margin of which is tomentose from a tendency to become reflected; the lower margin whitish; teeth scattered, cylindrical, often adnate on the lower side.

* **Radulum aterrimum.** *Fr.*—Arctic America. Drummond.

* **Radulum molare.** *Fr.*—No. 736 on alder. No. 786 on *Ulmus Americana* No. 2175 on *Carya*. No. 2325, 2405 on oak. No. 4745 on pine. No. 5994, Penns. Michener. Ravenel, No. 650, 1539. On bark of various trees. No. 4745 approaches *R. pallidum*, but is quite distinct.

* **Radulum lætum.** *Fr.*—No. 5400. New England, Sprague.

204. **Radulum spinulosum.** *B. & C.*—Effusum, isabellinum, margine elevato tomentoso, dentibus minutis sparsis spinulosum. No. 4543. Alabama, Peters.

Effused, opaque, of a pallid pinkish grey; margin slightly raised, tomentose; hymenia sprinkled with short spicules.

205. **Radulum Bennetii.** *B. & C.*—Totum resupinatum pallidum rimosum, tuberculis brevibus exasperatum. No. 6328. Rhode Island, J. L. Bennett.

On decorticated white wood.

Entirely resupinate, without any distinct border, pallid, cracked into little areolæ; rough, with short tubercles.

* **Phlebia vaga.** *Fr.*—No. 2713, Car. Inf. No. 5606. C. Wright, Connecticut.

206. **Phlebia orbicularis.** *B. & C.*—Hook. Journ. 1849, p. 237. Primum orbicularis fascia demum latereliter confluens fasco-purpureum, margine elevato, venis e centrali puncto radiantibus. No. 1281. Car. Inf. On dead sticks.

Purple-brown, orbicular, then confluent, but always retaining the radiating disposition of the veins; margin more or less elevated.

207. **Phlebia zonata.** *B. & C.*—Fusca secernibilis subtus zonata subtomentosa; venis depressis radiantibus. No. 2086, 2946. Car. Inf. Rav. No. 1538. On oak limbs.

Rigid, coriaceous, brown, separable from the matrix, zoned beneath, and sometimes above, slightly tomentose, veins depressed, radiating. Mycelium white.

208. **Phlebia rubiginosa.** *B. & Rav.*—Rav. Fasc. III. 23. Margine reflexo rubiginoso tomentoso; hymenio fusco; venis elevatis. Rav. No. 886, 1450. On oak rails.

Forming small oblong patches or widely effused; margin elevated, tomentose, ferruginous; hymenia brown; veins prominent. Nearly allied to the last.

209. **Phlebia anomala.** *B. & Rav.*—Tota resupinata, margine e strato inferiore adnato pallido; hymenio e rufulo fusco; venis obscuris. Rav. No. 1449. On fallen oak limbs.

Entirely adnate; margin narrow, pallid from the projection of the lower stratum; hymenium tinged with rufous, at length brown; veins very obscure, so that it approaches *Corticium*.

210. **Grandinia alutacea.** *B. & Rav.*—Rav. Fas. IV. 11, læte alutacea, late effusa, papillis sparsis. Rav. No. 1848. Car. Inf.

Bright tan-coloured, widely effused over bark; edge sometimes

slightly raised; papillæ granular, scattered, so as to leave some parts nearly free.

211. **Grandinia tuberculata.** *B. & C.*—*Hook. Kew. Misc. i. p. 237.* *Crassiuscula pallida*, papillis magnis ceraceis obtusis. No. 1111. *Car. Inf.* On *Carya*.

Forming a rather thick resupinate stratum, consisting entirely of rather large obtuse papillæ, apparently the same as *Hydnum Botrytis*, Schwein.

212. **Kneiffia tessulata.** *B. & C.*—*Pallida adnata resupinata rimosa*; margine tenuissimo sterili; granulis irregularibus. No. 2805. *Car. Inf.* On oak. On decayed wood.

Margin very thin, barren, hymenium cracked, pallid, thickly covered with the prominent irregular granules.

* **Kneiffia setigera.** *Fr.*—*Rav. Fasc. v. 31.* No. 2698, 2699, 2760, 4778. On oak. *Car. Inf.* No. 3759 on pine. No. 3899. Texas, C. Wright, seems to be a young state.

213. **Kneiffia candidissima.** *B. & Rav.*—*Rav. Fasc. v. 32.* *Candidissima primum corticioidea, sero granulis frequentibus apiculatis sparsa.* No. 1376. *Car. Inf.* No. 1791, Ravenel. On *Juniperus virginiana*.

At first forming a thin pure white stratum, looking like a *Corticium*, without granules, at length thickening and sprinkled with numerous granules. Occasionally it acquires a slight ochraceous tinge.

214. **Odontia lateritia.** *B. & C.*—*Rav. Fasc. v. 24.* *Effusa immarginata lateritia, matricem tingens.* No. 6084. Alabama, Peters. On fallen oaks.

Widely effused, without any distinct margin; brick red, staining the wood with the same tint; spines short, tomentose.

This appears to be the same with *Phlebia hydnoidea*, Schwen. *O. albo-miniata*, B. & C. is a peculiar state of *Polyporus sanguineus*.

* **Craterellus clavatus.** *Fr.*—No. 5786. Maine, Sprague.

* **Craterellus crispus.** *Fr.*—No. 5713. New Engl., Sprague.

* **Craterellus sinuosus.** *Fr.*—No. 2982. *Car. Inf.* Ravenel.

* **Craterellus cornucopioides.** *Fr.*—No. 502. *Car. Sup.* No. 3445. New York, Sartwell. Ohio, Lea. *Rav. Fasc. ii, 27.*

215. **Craterellus lateritius.** *B.*—*Pileo profunde umbilicato lobato stipite deorsum angustato hymenioque radiato venosolateritiis.* No. 4539. Alabama, Peters.

On the ground; 2 inches wide; brick-red; pileus deeply umbilicate, cyathiform, margin lobed; stem $1\frac{1}{2}$ inch high, dilated above; veins narrow, radiating. This is *Thelephora craterellus*, Schwein. Fine specimens were gathered in Ohio by F. G. Lea.

* **Craterellus lutescens.** *Fr.*—No. 5773. New Engl., Sprague, No. 1689. Santee River.

* **Craterellus odoratus.** *Schwein.*—No. 1288. Car. Inf.

216. **Craterellus unicolor.** *Rav.*—Fasc. ii., 26. Pallide fuscus, umbilicatus; stipite sursum incrassato in hymenium rugosum effuso. About an inch high, $\frac{1}{2}$ -1 inch across, pale brown; stem dilated upwards, confluent, with the rugose hymenium lobes very much like some *Omphalia* infested with *Hyphomyces*.

* **Thelephora multipartita.** *Schwein.*—No. 5265. New Engl. Sprague.

217. **Thelephora regularis.** *Schwein. MSS.*—Pileo cyathiformi demum parce fisso; stipite cylindrico. No. 1206. Car. Inf.

Pileus about $\frac{3}{4}$ inch across, cup-shaped, at first quite regular, then slightly divided, subcoriaceous, stem 1 inch high, cylindrical, nearly equal; hymenium slightly veiny. The whole plant has a more or less rufous tinge.

* **Thelephora caryophyllæa.** *Fr.*—*Rav.* Fasc. ii., 28. No. 1559. Santee River.

218. **Thelephora Ravenelii.** *B.*—Pileo cyathiformi lobato fisso pallido lineato subtiliter tomentoso; stipite brevi cylindrico pallido; hymenio demum fusco. *Rav.* 1498. Green Ville, Car. Inf.

Pileus $\frac{1}{2}$ -1 inch across, cup-shaped, lobed and split, minutely tomentose; stem pallid, cylindrical, about $\frac{1}{2}$ an inch high, not a line thick; hymenium at length brown. In larger specimens there are narrow zones.

* **Thelephore gausapata.** *Fr.*—No. 3988. Alabama, Peters.

219. **Thelephora pteruloides.** *B. & C.*—Pileo primum infundibuliformi ochraceo, demum in lacinias acutas fisso; stipite compresso. No. 1745. Car. Inf. No. 5326. New Eng., Sprague.

On the ground, gregarious, crowded, bright ochraceous, at least when dry, $1\frac{1}{2}$ inch high; pileus at first infundibuliform, at length split into numerous acute laciniae, which are slightly tomentose below, smooth above; stems crowded, compressed, dilated upwards.

220. **Thelephora filamentosa.** *B. & C.*—Pileis filiformibus pallidis e mycelio lato communi oriundis. No. 6071. Alabama, Peters.

Growing on decayed matted herbaceous fragments, on which it forms a mycelium, which is in part smooth, in part filamentous; pilei thread-shaped. A very curious species, but the specimens scarcely show whether the pilei are really filiform or deeply split.

221. **Thelephora hicens.** *B. & Rav.*—Pileo lobato fiscoque tomentoso pallido; stipite brevi tomentoso, hymenio rimoso. *Rav.* No. 1303. Car. Inf.

On the ground. Pileus about an inch across, deeply lobed and split, pallid, tomentose, as is also the short stem; hymenium grey, at length rimose, probably from its being of a softer consistence than in neighbouring species.

* **Thelephora cladonia.** *Schwein.*—No. 3272. Texas, C. Wright. Arctic America, Drummond.

* **Thelephora pallida.** *Schwein.*—No. 250, 515, 524. Car. Sup. No. 1131. No. 1251. Car. Inf. No. 3645. Texas, Lindheimer. No. 5763. Nov., Ang. Sprague. Rav. Fasc. ii., 29.

* **Thelephora vialis.** *Schwein.*—No. 1660. Car. Inf.

222. **Thelephora tephroleuca.** *B. & C.*—Pileo primum subinfundibuliformi late lobato albido rugoso, hymenio fusco. No. 3555. Penns., Michener, No. 1504. Rav. Cæsar's Head. Car. Inf.

On the ground.

At first somewhat infundibuliform, broadly lobed, dirty white, rough, with little raised wrinkles; hymenium brown below, pale above, nearly even. One to two inches or more across.

223. **Thelephora aculeata.** *B. & C.*—Infundibuliformis lata; marginem laciniato; superficie aculeata; hymenio pallidiore. No. 2009. Car. Inf.

On the ground, two or three inches across; margin lacinate, the surface rough, with adpressed prickly-like processes; brownish above, pale beneath. A very fine species, of which I have only an imperfect specimen.

* **Thelephora laciniata.** *P.*—No. 2693, 4729. Car. Inf. A zoned variety.

* **Thelephora cuticularis.** *B.*—No. 1851. Rhode Island. Olney. Ohio, Lea.

* **Thelephora albo-marginata.** *Schwein.*—No. 1009, Santee River. No. 369,793, on *Cornus florida*. Car. Sup., and No. 1368, Car. Inf. on *Castanea pumila* appear to be the same. Fine specimens were gathered by Lea on *Platanus occidentalis*, in Ohio.

* **Thelephora arida.** *Fr.*—No. 3728, Car. Inf. Spores lemon-shaped, .0004 long.

* **Thelephora umbrina.** *Fr.*—No. 4063, Penns., Michener. No. 6090. Alabama, Peters. No. 6210. New England, Sprague.

* **Thelephora ferruginea.** *Fr.*—No. 1578. Car. Inf.

224. **Thelephora granosa.** *B. & C.*—Effusa tenuis fusca; mycelio byssoidea; hymenio granulato. No. 2485. Car. Inf. On oak and Polypori. No. 3700 on pine. Car. Inf. No. 3949, 4160. Penns. Michener, No. 5283. Alabama, Peters.

Forming a thin, black-brown stratum on various kinds of wood, &c., with a floccose brownish mycelium; hymenium distinctly and closely granular. *Thel. olivacea* *M.* (β , *botryoides*, *Schwein*) is the same species.

* **Thelephora laxa.** *Fr.*—Rav. No. 1308. On oak limbs. No. 782. Mass., Sprague.

* **Thelephora anthochroa.** *P.*—No. 4536. Alabama, Peters.

* **Thelephora biennis.** *Fr.*—Rav. No. 790. Car. Inf. *Thel. albo-brunnea*, *Schwein*.

- * **Thelephora incrustans.** *P.*—No. 570. Car. Sup.
 * **Thelephora sebacea.** *Fr.*—No. 4872. Penns., Michener, No. 5821. New Eng., Sprague. Rav. No. 1619. Car. Inf.
 * **Thelephora pedicellata.** *Schwein.*—No. 3807. Alabama, Peters. On Cornus.
 * **Thelephora arida.** *Fr.*—No. 2362. Car. Inf. On pine.
 225. **Thelephora Murraini.** *B. & C.*—Journ. Linn. Soc., x., p. 329. Effusa, carnosocrustacea; margine angusto tomentoso pallido; hymenio rimoso granulato; ex albido subcarneo-griseo. No. 5809, New Eng., Murray. Also Cuba.
 Effused, of a thick, rather fleshy substance, margin pallid, narrow, tomentose, hymenium cracked, granulated, at first whitish, then of a greyish flesh-colour.

ON SEXUAL REPRODUCTION IN THE PERONOSPORÆ.

By DR. ANT. DE BARY.*

[At this time, when attention is directed more specially to the Potato Disease, on account not only of its devastations, but also of the prize which has been offered for its elucidation, the following observations may be opportune.]

In the form and initial mode of development of their sexual organs, the *Peronosporæ* are completely analogous to the monœcious types of the *Saprolegniæ*. It is in the intercellular spaces of the living phanerogamic plants, inhabited by these parasites, that we find their oogonia, which are large, rounded cells, filled with plasma. These cells generally terminate certain branches of the mycelium, and are only rarely interstitial. Long before the oogonium has reached its normal dimensions, there springs from the filament which bears it, or from some other neighbouring one, a slender branch, which is firmly applied by its free extremity to the walls of the said organ. Then this branch ceases to elongate, its extremity inflates, takes a basilar division, and thus becomes a distinct cell, a clavate, or oval antheridium, which is straight, and of less diameter than the oogonium, firmly applied to the latter by a relatively extensive surface. I have never met with an adult oogonium which was certainly without an antheridium, and I have only very rarely seen oogonia with two antheridia.

When the two sexual organs have attained their full development, the protoplasm contained in the oogonium is divided into a peripheric layer, with but few granules, and almost homogeneous; and into a central rounded mass, which is rendered opaque by

* Translated from "Morphologie und Physiologie der Pilze," in Hofmeister's "Handbuch," vol. ii., cap. v. By the Editor.

accumulated granules of fatty matter. This mass is what I call the gonosphere. Immediately this is formed, the antheridium emits from its contiguous side a tubular and slender process, a sort of beak, which pierces the membrane of the oogonium, and reaches the gonosphere, crossing the ambient plasma. As soon as this fecundating process has touched the surface of the sphere in question, it no longer increases, but the latter becomes enveloped in a fine membrane of cellulose, and takes all the characteristics of an oospore.

The antheridium is at first filled with a rather dense protoplasm, which, at the moment of fecundation, often represents a rounded central sphere, from which slender processes radiate in all directions. This appearance is preserved before and after fecundation, and even until the perfect maturity of the oospore. The extremity of the fecundating canal remains closed, and is intimately joined to the membrane of the oospore. There is no appearance of spermatozooids. The mode of action of this fecundating tube on the gonosphere may then be compared to the pollen tube in phanerogamic plants. The cellulose membrane with which the oospore is enveloped then becomes thicker, and finally its endospore is a solid inner integument, made up of several superimposed layers. At the same time there is formed outside, and around this interior cell, a second protecting membrane, which is ordinarily resistant, and is the epispor. This gradually passes from brownish yellow to a darker tint, and is finally ornamented on its surface, according to the species of *Peronospora*, with warts, folds, filiform and articulated prominences, &c. In *Cystopus* the epispor is made up of encrusted cellulose. This outer tegument is formed at the expense of the peripheric plasma of the oogonium, which is by degrees precipitated on the oospore, and assumes consistency. The ripe oospore occupies the centre of the oogonium, in the midst of a fluid of an aqueous nature, and only holding in suspension a few scattered granules. As regards the wall proper of the ripe oogonium, it is, according to the species of fungus under consideration, either very much thickened and rigid, or thin and somewhat evanescent. The endospore finally surrounds a finely granulated plastic layer, which forms, as it were, an envelope around a large central vacuole. The fecundating tube remains recognizable until the maturity of the spore, and it is generally covered by a case, which, proceeding from the epispor, extends as far as the side of the oogonium.

The oospores of the *Peronosporæ* germinate after a prolonged repose, which lasts at least as long as the winter. As yet two modes of germination are known; in the *Cystopus candidus* the endospore becomes swollen with its contents under the influence of water, then the epispor bursts at one point, and allows a broad, short, obtuse hernia to issue. Then large and changing vacuoles are observed in the protoplasm, then it divides simultaneously into a multitude of equal parts, which soon become so many zoospores,

quite similar to those which are engendered in the sporangia without previous fecundation. Immediately after this division, the herniary prominence, which we mentioned as issuing from the episporium, increases into a globose, and very thin bladder, into which the zoospores pass to commence their agile movements, but this vesicle soon dissolves, in order to allow the zoospores to disperse.

In *Peronospora valerianellæ*, and the most nearly allied species, the oospore, when germinating on a damp body (but not in water) emits a tubular filament, the membrane of which proceeds from the inner layer of the endospore, and which has broken the exterior integument of the spore. The germ elongates considerably, ramifies, and assumes completely the appearance of the mycelium of the *Peronospora*. Its introduction into the nourishing plant has not yet been observed.*

SEXUAL REPRODUCTION IN THE ERYSIPHEI.

By DR. ANTON DE BARY.

Amongst the Fungi whose sexual organs are known, we must certainly place *Erysiphe*, according to the researches which I published on the fructification of the *Ascomycetes* (Leipzig, 1863). The fecundated oogonium or oocyst in *Erysiphe* does not develop into a simple oospore, but into a complex perithecium, which encloses the thecæ, or sporidia-bearing cells. The mycelium of *Erysiphe cichoracearum*, like that of other species, consists of branched filaments crossed in all directions, which adhere as they climb to the epidermis of the plant on which the fungus lives as a parasite. The perithecia are engendered where two filaments cross each other. These swell slightly at this point, and each emits a process which imitates a nascent branch, and remains upright on the surface of the epidermis. The process developed from the inferior filament soon acquires an oval form, and a diameter double that of this filament, then it becomes isolated from it by a septum, and constitutes a distinct cell, which I qualify as an oocyst. The appendage which proceeds from the superior filament always adheres intimately to this cell, and elongates into a slender cylindrical tube, which terminates in an obtuse manner at the summit of the same cell. At its base it is also limited by a septum, and soon afterwards another septum appears a little below its extremity, at a point intimated beforehand by a slight strangulation. This new septum completes a terminal, short, and obtuse cell (the antheridium), which thus becomes borne on a narrow tube like a sort of pedicel. Immediately after the formation of the antheridium, new productions show themselves, both around the oocyst and within it.

* More ample details will be found in "Botan. Zeitung, 1861," p. 89, and "Ann. des. Sci. Nat.," ser. 4, vol. xx. (1862).

Underneath this cell, and from the filament which bears it, are seen to spring eight or nine tubes, which join themselves to each other by their sides and to the pedicel of the antheridia, while they apply their inner face to the oocyst, above which their extremities soon meet. Each of these tubes is then divided by means of transverse septa into two or three distinct utricles, and in this manner the multicellular wall of the perithecium springs into existence. During this time the oocyst enlarges and divides, without its being possible to detect precisely how it happens, into a central cell, and an outer layer, which is ordinarily simple, of smaller utricles contiguous to the general enveloping wall. The central cell becomes the single theca proper to the species of *Erysiphe* of which we are speaking, and the layer which surrounds it constitutes the inner wall of the globose perithecium. The only changes which are afterwards to be observed are the considerable increase of the perithecium, by the fact of the development of all its component cells, the production of the radicular filaments which proceed from its outer wall, the brown tint which this assumes, and finally the formation of the spores in the theca. The antheridium remains for a long time recognizable without undergoing any essential modification, but the dark colour which the perithecium assumes finally hides it from the eye of the observer.

In other species of *Erysiphe*, oocysts and antheridia, but slightly different in form from those just described, may be seen. The structure of their perithecia, when they are ripe, agrees also as regards the principal characteristics with that of the one we know, only these conceptacles generally enclose several thecæ, among which are distributed numerous series and special groups of barren cells. In consequence, the method of division of the oocyst must be much more complex than in *Erysiphe cichoracearum*, but this phenomenon has not as yet been visible, on account of the opacity of the young perithecia. Concerning the final structure of the perithecia, the first volume of "Selecta Fungorum Carpologia," of M. M. Tulasne, may be consulted, as also the dissertation published by them in the "Annales."*

Bonds of analogy, as regards the formation of the perithecia, doubtless unite the genus *Eurotium* to *Erysiphe*. As I have shown elsewhere,† the generative filaments of the perithecia in the *Eurotium* twist together at their summit like a corkscrew, and generally present six turns of a screw solidly united to each other, and forming a conical hollow body. After a short time this body is slightly swollen, and composed of a multitude of rounded cells, which even fill its central cavity. The most superficial of these cells are again very distinctly arranged in spiral series. How the changes and sub-divisions of cells, which bring about this second state of the young perithecium, take place, has not as yet been ascertained; at

* "Annales des Sci. Nat.," sec. 4, vol. vi., p. 299.

† "Botanische Zeitung," for 1854.

any rate, it is not improbable that some phenomenon (fecundation or copulation) takes place, which is connected with our subject. The multi-cellular body increases by the multiplication and subdivision of its component cells, and soon assumes a globose form. The cells of the superficial layer (or simply their exterior wall, which will have to be examined anew) become polygonal, assume a yellow colour, and constitute the thin integument of the conceptacle. In the interior of this the cellular partition still continues for a long time, until finally all the utricleles have become rounded oval thecæ, and normally octospores.

HUNGARIAN FUNGI.

"Kalchbrenner Karoly : Icones selectæ hymenomycetum hungariæ."

The work is edited by and at the expense of the Hungarian Academy of Sciences ; it will be published in three parts, the first of which has appeared already. The text as well as the work of the plates, are a most successful imitation of the "*Icones selectæ hymenomycetum of Fries*," so far, that the now publishing Hungarian work may be considered a continuation of the Swedish. The Hungarian and Latin text is arranged in columns, and as far as the description of the pileus is concerned, it is quite on the level of the science of the present day.

The 10 plates of the first part published contain the following new or little known species—

1. Ag. Amanita, aureola, Kalchbr.
2. Ag. Amanita, cygnea, Schulzer.
3. Ag. Lepiota, nymphaeum, Kalchbr.
4. Ag. Lepiota, Schulzeri, Fries.
5. Ag. Tricholoma, macrocephalus, Schul.
6. Ag. Tricholoma, psammopus, Kalchb.
7. Ag. Tricholoma, argyricus, Kalchb.
8. Ag. Tricholoma, centurio, Kalchb.
9. Ag. Tricholoma, tumulosus, Kalchb.
10. Ag. Clytocybæ, trullæformis, Fries.
11. Ag. Collybia, atramentosus, Kalchbr.
12. Ag. Collybia, plumipes, Kalchb.
13. Ag. Collybia, rancidus, Fries.
14. Ag. Mycena, caesiellus, Kalchb.
15. Ag. Omphalia, cyanophyllus, Fries.
16. Ag. Omphalia, reclinis, Fries.
17. Ag. Pleurotus, sapidus, Schulz.
18. Ag. Pleurotus, pardus, Schulz.
19. Ag. Pleurotus, superbiens, Schulz.
20. Ag. Annularia, Fenzlii, Schul.
21. Ag. Pluteus, patricius, Schutr.

FR. HAZSLINSZKY.

Eperies, Hungary.

BRITISH FUNGI.

By M. C. COOKE.

(Continued from p. 132.)

Peziza (Mollisia) pteridis. A. & S. "Bracken Peziza."

Sessile, small, between waxy and soft, cup-shaped, internally dingy yellowish, externally subgranulose, olivaceous, margin crenate. Asci oblong, sessile; sporidia oblong-clavate, hyaline.—*Alb. & Schw. Consp. t. xii. f. 7. Fckl. exs. No. 2191. Trichopeziza pulveracea, Fckl. Sym. Myc. p. 297.*

On stems of *Pteris aquilina*. Darenth (M. C. C.) King's Lynn. (C. B. Plowright.)

Sporidia (·0003-·0004 in.) ·008-·01 m.m. long. Nearly black when dry. The figure in *Alb. & Schw.* is much paler externally than the specimens published by Fückel with which ours agree.

Nectria Leightonii. Berk. "Leighton's Nectria."

Scattered, minute; perithecia ovate, yellow, or lurid-red; sporidia subcymbiform, triseptate, hyaline.—*Berk. in Fungi Cubensis. Linn. Journ. (1868), p. 379.*

On Larch, &c. Yorkshire. (Rev. W. Leighton.)

Also found in Cuba. Sporidia (·001 in.) ·025 m.m. long.

Nectria furfurella. B. & Br. "Mealy Nectria."

Springing from a flesh-coloured effused stratum; perithecia flesh-coloured, subglobose, then collapsed, sprinkled with furfuraceous, shining particles; ostiolum distinctly punctiform. Sporidia ovate. Paraphyses branched. Conidia ovate.—*Berk. & Br. Annals Nat. Hist., No. 1331, t. xx., f. 22.*

On cabbage stalks. Feb., 1869.

Sporidia (·00015-·0002 in.) ·0035-·005 m.m. long. Conidia (·0002-·0003 in.) ·005-·0075 m.m. long.

Diatrype (Diatrypella) verrucæformis. Ehrh. var. **Tocciaæana.** De Not.

Pustulæform, subhemispherical, depressed at the apex, fuscous, soon naked. Perithecia 3-6, seldom more, spheroid, with a short neck. Asci clavate, very much elongated at the base, polysporous. Sporidia minute, spermatoid.—*De Not., Sfer. Ital., p. 30, t. 31. Fckl. Sym. Myc., p. 233. Fckl. exs., No. 2059. Rabh. Fung. Eur. No. 253. Cooke exs. No. 483.*

On *Alnus glutinosa*. King's Lynn. (C. B. Plowright.)

Valsa cypri. Tul. "Privet Valsa."

Perithecia 3-8 minute, circinating, buried in the inner bark, globose, collapsing, ending in very short attenuated necks, which are collected in a truncated disc; ostiola small, scarcely emergent, black. Asci subclavate; sporidia cylindrical, curved, simple, hyaline. Spermatogonia unilocular, globose; spermatia cylindrical, curved, issuing in olivaceous tendrils.—*Tul. Carp. ii. 194, t. 25, f. 10-20. Fckl. Sym. Myc., p. 198. Fckl. exs., 1969. Nitschke Pyren. Germ., p. 206.*

On twigs of *Ligustrum vulgare*. Twycross.

Sporidia ($\cdot 0004 \times \cdot 000075$ in.) $\cdot 011 \times \cdot 002$ m.m. Spermatia ($\cdot 0002\text{--}00025 \times \cdot 00005$ in.) $\cdot 005\text{--}\cdot 006 \times \cdot 0015$ m.m.

Sphæria (Villosæ) felina. *Fckl.* "Fuckel's Hairy Sphæria."

Perithecia scattered, globose, everywhere covered with erect hairs, black; ostiola truncate, conical, short. Asci broad. Sporidia clavato-falciform; conidia brown, pentagonal or doliiform, concatenate, springing from flexuous horizontal threads.—*Fckl. Fungi. Rhen., No. 945. Berk. & Br. Ann. Nat. Hist., No. 1332, t. xx. f. 23. Lep-tospora Felina. Fckl. Syn. Myc., p. 144.*

On *Rubus*. Mar.

Sporidia ($\cdot 0025$ in.) $\cdot 065$ m.m. long; conidia ($\cdot 001\text{--}\cdot 002$ in.) $\cdot 025\text{--}\cdot 050$ m.m. long.

Sphæria (Villosæ) cupulifera. *B. & Br.* "Cup-bearing Sphæria."

Perithecia conical, obtuse, at length collapsed, delicately rugulose, shining, with here and there erect, articulate, rigid, even flocci, the ultimate articulations wedge or cup-shaped, resolved into truncate cuneate conidia. Sporidia fusiform, at length 4-septate.—*Berk. & Br. Ann. Nat. Hist., No. 1333, t. xxi., f. 24.*

On rotten elm roots. April.

The cladotrichoid hairs sometimes spring immediately from the mycelium. The conidia are sometimes pentangular; sporidia ($\cdot 0008\text{--}\cdot 001$ in.) $\cdot 02\text{--}\cdot 025$ m.m. long; conidia ($\cdot 0005$ in.) $\cdot 0125$ m.m. long, ($\cdot 0003$ in.) $\cdot 0075$ m.m. wide at the top.

Sphæria (Denudatæ) pomiformis. *P.* Handbook, No. 2580.

CONIDIA.—Flocci erect, simple, articulated, white, the two superior articulations minutely echinulate, acrospores elliptical, brown, borne on distinct, narrowly elliptical sporophores, forming a subglobose head.—*Sporocybe albipes, B. & Br., MSS., Ann. Nat. Hist. No. 1333* t. xxi., f. 28.*

Acrospores ($\cdot 0003\text{--}\cdot 0006 \times \cdot 0002\text{--}\cdot 00025$ in.) $\cdot 0075\text{--}\cdot 015 \times \cdot 005\text{--}\cdot 006$ m.m.; threads ($\cdot 004\text{--}\cdot 009$ in.) $\cdot 1\text{--}\cdot 225$ m.m. high.

Sphæria (Erumpentes) lichenicola. *De Not.* "Solorina Sphæria."

Perithecia innate, erumpent, scattered or crowded, rounded, verrucose, black, pierced with a punctiform ostiolum which is scarcely conspicuous, and impressed. Asci clavate; sporidia cylindrical, obtuse, sometimes curved, at first binucleate, at length quadri-locular and slightly coloured. (Not *Sph. lichenicola*, *Somm.*)

Bertia lichenicola, De Not., in Rabh. Fung. Eur. No. 950.

On Thallus of *Solorina crocea*. Scotland. (*Dr. Stirton.*)

Sporidia ($\cdot 0015\text{--}\cdot 002$ in.) $\cdot 04\text{--}\cdot 05$ m.m. long. *Bertia Solorinæ*, Anzi (*Hedwigia*, viii., p. 14), is closely allied, but seems to be distinct.

Sphæria (Ceratostoma) crinigera. *Cooke.* "Woolly-beaked Sphæria."

Subgregarious or scattered, black. Perithecia subglobose, semi-immersed, pubescent. Ostiola spinulose. Asci cylindrical, narrow. Sporidia uniseriate, elliptical, triseptate, hyaline.

On pine wood. King's Lynn. (*C. B. Plouright.*)

Allied to *Sphæria cirrhosa*, Fr. Sporidia ($\cdot 0004\text{--}\cdot 0005$ in.) $\cdot 01\text{--}\cdot 0125$ m.m. long.

BRITISH MOSSES.

From Hobkirk's "Synopsis" we have extracted two or three descriptions of recently discovered species, which may be of service as indicating the character of that work, and its claims upon all students of British Bryology.

Bartramia (Philonotis) adpressa. *Ferg.*—Plant widely cæspitose, erect, 2-3 in. either dull, glaucous green or reddish; leaves papillose, erect when moist, with one wide plica on each side of nerve, incurved towards apex, slightly twisted when dry, widely ovate from an amplexical base, not acuminate, apex either obtuse or cucullate, with a very slight mucro, or in the slender forms rather acute, margin denticulate, slightly reflexed; nerve very thick, continuous; areolæ small, ovoid above, shorter and wider towards the base. *G. E. Hunt, Mem. Lit. & Sci. Soc., Manchester, v. 102. Hobk. Syn., p. 130.*

Glen Prossen, &c., Clova (Fergusson); Glas Mheal, Perthshire, 2,500 ft. (Hunt).

Hypnum Breadalbanense. *Buchanan White.*—Stem procumbent or sub-erect, covered with villi; vaguely pinnate; leaves secund ovate lanceolate concave, nerve strong single, reaching about half way, margin of base slightly recurved; sub-denticulate. *Hobk. Syn., p. 172.*

Breadalbane Mountains, and Ben Lawers, 1865. (Dr. F. B. White.) Fruit not known.

Hypnum rupestre. *Buchanan White.*—Stem procumbent, covered with very short villi, irregularly pinnate; leaves strongly falcato-secund, lanceolate-acuminate from a wide base, much curved; obscurely two-nerved, margin plane, scarcely denticulate. *Hobk. Syn., p. 172.*

Ben Lawers, Aug., 1865. Fruit unknown.

Bryum (Webera) Breidlerii. *Juratzka.*—Dioicous. Stem $1\frac{1}{2}$ in., reddish brown and procumbent below, light green above, leaves ovate, decurrent, erecto-patent, concave, serrate towards apex, margin recurved, thinly nerved nearly to apex, areolæ narrow-elongate, upper acute at both ends, lower quadrate; male flowers terminal discoid, outer perig. leaves spreading elliptic-lanceolate, saccate at base, margin strongly recurved, apex cucullate serrate; inner obovate, suddenly acuminate; perich. leaves linear-lanceolate, strongly nerved; capsules oval pendulous, glaucous green when young, pale reddish brown when ripe, on a slender seta geniculate at base. *Hunt, Mem. Lit. & Phil. Soc. Manch., 1871-2, p. 101. Hobk. Syn. App., p. 187.*

Wet débris of slaty rocks near springs.

Glen Callater, Loch-na-gar, Carnlochan Glen (Hunt).

With pleasure we also give publicity to the "Notice to Collectors," which is placed at the commencement of this volume, as follows:—

"It is my intention, as soon as sufficient material can be accumulated, to publish 'A Geographical Distribution of the British Mosses,' and in furtherance of this object I should esteem it a great favour if all collectors throughout the kingdom would kindly be at the trouble of forwarding to me, as early as convenient, complete lists of the mosses found by themselves or their friends, in their several districts, with any notes they may think desirable respecting them, and, where possible, the range and habitat of the various species. I feel sure I have only to mention this to ensure an abundant return of information for a work which is really wanted, and shall, as far as any exertions on my part can ensure it, be really valuable."

This information should be forwarded to C. P. Hobkirk, Esq., Arthur Street, Huddersfield.

LICHENS OF SOWERBY'S HERBARIUM.

By REV. J. M. CROMBIE, M.A.*

No. II. *Parmelia*—*Gyrophora*.

1. **Lichen perforatus.** *E. B. t.*, 2423. = *Parmelia perforata*, var. *ciliata*, D.C. The middle fig. with the perforated apothecia being from an exotic specimen. The true *Parmelia perforata* (Wulf) = *P. reticulata*, Tayl., is distinguished by its minutely reticulato-rimose thallus, of which the medulla gives reaction with K +, yellow, and then red. It is very rare in Britain, though a specimen with young apothecia from Dunkerron, Ireland, occurs in herb. Brit. Mus.

2. **Lichen physodes.** *E. B. t.*, 126. = *Parmelia physodes* and its var. *labrosa*, Ach. The fig. is a composite one, made up of the type and this variety, which latter is more distinctly delineated in fig. 5. Fig. 3 = var. *recurva*, Leight. Lich. Fl. p. 126, which is a condition of var. *labrosa*. The var. *vittata*, Ach., though not drawn, also occurs in herb. Sowerby, and is referred to in the description.

3. **Lichen incurvus.** *E. B. t.*, 1375. = *Parmelia Mougeotii* (Schær.) The specimen drawn, is not true *P. incurva* (Pers.), as certain expressions in the description would lead us to suppose, but a very characteristic specimen of the larger form of *P. Mougeotii*, connecting it with *P. conspersa*. True *P. incurva* = *Lichen multifidus*, Dicks., Crypt. III., p. 16, t. 9, f. 7, is not unfrequent, though with the apothecia not very well developed on the mountains of Braemar, where also *f. discreta*, Nyl. pro p. occurs, but infertile.

4. **Lichen encaustus.** *E. B. t.*, 2049. = *Parmelia alpicola*, Th. Frs. The colouring of the fig. and the language of the description—"This dirty ill-looking Scotch plant, both point to *P. alpicola* as the species denoted, which is confirmed by the specimen in herb.

* Condensed from "Journal of Botany," Dec., 1872.

Sowerby, and the fragment attached to the original drawing. True *P. encausta*, Sm. Linn. Trans., 1. p. 83, t. 4, f. 6, is a very rare species in Britain, and seems to have been gathered only on one or two of the higher Grampians in Braemar.

5. **Parmelia ambigua.** *E. B. S. t.*, 2796 = *P. ambigua*, Ach. Nyl. and *P. aleurites*, Ach., Nyl. The former is represented by the two lower figs., and the latter by the two upper; the British specimens of both, which are found in herb. Sowerby, being barren, as in figs. For the correct synonymy of these two species, vid. Nyl. *Animad. circa F. Arnold*, in Flora, 1872, which is so far confirmed by specimens in Herb. Linn. Soc. Lond.

6. **Lichen ciliaris.** *E. B. t.*, 1352. = *Physcia ciliaris* (Linn.), and *f. actinota*, Ach. The specimen drawn, from Bedfordshire (Abbot), has, as is usually the case in Britain, some of the apothecia with the margin smooth, and others with it proliferous. Hence, as the margin thus varies in one and the same specimen, a separate name is not necessary for the so-called form.

7. **Lichen pulverulentus.** *E. B. t.*, 2063. = *Physcia pulverulenta*, var. *laciniolata*, mihi. Although the fig. has been referred to var. *venusta*, Ach., which has the apothecia crowned with short horizontal laciniae, yet, as these are also scattered over the thallus in the specimen drawn, as shown in the middle fig., this evidently represents a better developed condition than *venusta*, and may be named as above.

8. **Lichen stellaris.** *E. B. t.*, 1697. = *Physcia stellaris* (?). The fig. by mistake was coloured green, vid. *E. B. sub Ph. pulverulenta*. The specimen drawn, which unfortunately does not occur in herb. Sowerby, may, judging from the fig., belong rather to *Ph. aipolia*, and represent an intermediate state between the type and var. *anthelina* (Ach.).

9. **Parmelia exosa.** *E. B. S. t.*, 2807. = *Physcia exosa* (Borr.), Leight. The specimen in herb. Sowerby, from Hurstpierpoint, Sussex, is evidently that drawn in *E. B.*, and was rightly separated by Borrer from *Ph. stellaris* var. *tribacia*, Ach., with which it has frequently been confounded.

10. **Lichens virellus.** *E. B. t.*, 1696. = *Physcia obscura* vars. *virella* (Ach.), and *ulothrix* (Ach.) Of these the former is represented in the two upper figs., and the latter in the lower fig. The supposed peculiar character of *ulothrix*, however, is found in other vars. of *Ph. obscura*, so that it can scarcely be considered distinct. *Lichen cycloselis* *E. B. t.*, 1942, is *Ph. obscura* (Ehrb.), sufficiently typical.

11. **Lichen elæinus.** *E. B. t.*, 2158. = *Physcia adglutinata* (Flk.) The specimen, drawn from the bark of trees, Sussex, shows that this is not *Pannaria elæina* (Whlbn.), which does not occur in Britain, but *Physcia adglutinata*, as observed by Borrer, *E. B. S. t.*, 2796, descript.

12. **Lichen candelarius.** *E. B. t.*, 1794. = *Physcia lychna* (Ach.). The specimen figured does not occur in herb. Sowerby, but fragments attached to the original drawing show that it is entirely as above. True *Lecanora candelaria* (Ach.), Nyl., is not the *Lichen candelarius* of our older British authors.

13. **Lichen proboscideus.** *E. B. t.*, 522. = *Gyrophora cylindrica*, Linn., and var. *denticulata*, Ach. Of these the type is represented in the two upper figs., and the var. in the two lower. The confounding of the two species, both of which occur in herb. Sowerby, *s. n. proboscideus*, as observed in *E. B. t.*, 2484 (the true *proboscidea*), was, owing to specimens of *cylindrica* being so named, no doubt by accident, in herb. Linnæus.

14. **Lichen pellitus.** *E. B. t.*, 931. = *Gyrophora polyrrhiza* (Linn.). Along with the specimen figured in herb. Sowerby is one of the polyphyllus var. *luxurians*, Ach., which is the form usually seen in the Scotch Highlands.

15. **Lichen deustus.** *E. B. t.*, 2483. = *Gyrophora flocculosa*, Hffm. The fruited specimen figured, from Swartz, is absent from herb. Sowerby, in which, under the same name, there appears from Scotland a specimen of *G. proboscidea*, which is evidently the *Lichen deustus* of Lghft. *Fl. Scot.* ii. p. 861. Of *G. arctica* there is no specimen in herb. Sowerby, nor is this likely to have been gathered in Devonshire.

CRYPTOGAMIC LITERATURE.

HOBKIRK, C. P.—A Synopsis of the British Mosses, containing Descriptions of all the Genera and Species, 196 pp London, 1873.

VENTURI, Dr.—“Ueber Orthotrichum,” in *Hedwigia*, No. 2, Feb., 1873.

JURATZKA, J.—“Bryologische Notizen,” in *Hedwigia*, for Feb., 1873.

SMITH, W. G.—“New Hymenomycetous Fungi from Stoves,” in *Journal of Botany*, for March, 1873.

WITT, OTTO N.—“Bericht über die Untersuchung zweier Diatomaceen-Gemische.” Ein Beitrag zur Kenntniss der Flora der Südsee. 1 plate, 4to. 1872.

NYLANDER, W.—“Addenda nova ad Lichenographiam Europæam,” in *Flora*, Jan., 1873.

WELLS, SAMUEL.—The Structure of *Eupodiscus Argus*, in *Monthly Microscopical Journal*, for March.

LANG, CAPTAIN F. H.—On Professor Smith's Conspectus of the Diatomaceæ, in *Monthly Micro. Journ.*, for March.

DE NOTARIS, DR. G.—Le Piante Crittogame prolusione ad un corso di esercitazioni critto-gamologiche. Rome, 1873.

STODDER, CHAS.—The Structure of *Eupodiscus Argus*, in the *Lens*, for Jan., 1873.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY,
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By THE REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 150.)

226. **Lachnocladium semivestitum.** *B. & C.*—*Delicatum repetiter furcato-ramosum, ramis tomentosis; apice glabris.* No. 4260. Penns. Michener. On the ground. From a common short stem straight forked branches arise, which are clothed below with whitish down, the acute tips alone being free.

227. **Lachnocladium subsimile.** *B.*—*Delicatum repetiter ramosum, flexuosum deorsum tomentosum.* No. 4600. New Jersey. On the ground. I had at first considered this as a form of *L. semivestitum*, but the ramification is very different. Even the base is flexuous, and the branches are not straight, while the tips are shortly forked.

228. **Lachnocladium Micheneri.** *B. & C.*—*Repetiter ramosum furcatum fuscum e caudice cylindrico subdiviso; basi albo-tomentosum.* No. 3534, 3763. Penns. Michener. On dead leaves, on which it forms an orbicular villous patch, from whence arise one or two stems, which are tomentose below and soon become repeatedly forked, the ultimate very acute divisions forming a dendroid tuft. It is difficult to say whether this should be placed in *Thelephora* or *Lachnocladium*.

* **Stereum calyculus.** *B. & C.*—Hook. Kew Misc. i., p 238. Pusillum; pileo cyathiformi subtiliter tomentoso opaco umbrino; stipite gracili concolore; hymenio albidio obsolete venoso. No. 1716. Pileus cup-shaped, $\frac{1}{3}$ inch across, extremely thin, umber, opaque, minutely tomentose. Stem $\frac{1}{2}$ inch high, $\frac{1}{3}$ line thick; hymenium whitish, very obscurely venose. x

229. **Stereum pergamenum.** *B. & C.*—Rav. Fasc. iii., 25. Pileo cyathiformi rufo vix zonato subtiliter lineato; margine tenui dentato laceratove; stipite cylindrico hymenioque albidis. No. 3814. Alabama, 4048ft. J. M. Peters. On decayed wood. Pileus 1-1 $\frac{1}{2}$ inch across, cup-shaped, bright rufous, not shining, minutely lineate, very obscurely zoned; margin thin, often toothed or lacinate; stem $\frac{1}{2}$ -1 $\frac{1}{2}$ inch high, 1 line thick, whitish, very minutely 7

tomentose; hymenium nearly of the same subochraceous tint. Either the same or a closely allied species. No. 13 Spruce, was gathered at Panuré on sticks, to which it was attached by a circular disc.

230. **Stereum Ravenelii.** *B. & C.*—Rav. Fasc. iv., 13. Gregarium e communi mycelio oriundum; pileo cyathiformi fusco; margine pallidiore plicato stipite gracili tomentoso hymenioque pallidis. No. 2630, 2980. Car. Inf. No. 4527, 4629. Alabama, Peters, Beaumont.

On the earth, in swamps. No. 4527 is apparently a coarser form, growing on wood. Pileus very variable in size, from a line to an inch across, cup-shaped, sometimes split on one side, brownish, with a slight admixture of red, paler towards the plicate margin; stem $\frac{1}{2}$ – $1\frac{1}{2}$ inch high, $\frac{1}{2}$ a line thick, gregarious, springing from a common mycelium, finely tomentose, pallid, as well as the hymenium, closely allied to *S. nitidulum*, *B.*

231. **Stereum tenerimum.** *B. & Rav.*—Pusillum, pileo cyathiformi cito lacerato tomentoso pallido glabrescente; stipite filiformi. Rav. No. 1437. No. 5029. Car. Sup.

On the ground amongst grass and mosses. Pileus 2–3 lines broad, cup-shaped, pallid, soon lobed and split, at first tomentose; margin sometimes deeply plicate; stem thread-shaped, $\frac{1}{3}$ – $\frac{3}{4}$ inch high, whitish, tomentose; hymenium even, or finely striate. This is very different from small forms of the last.

232. **Stereum rugosiusculum.** *B. & C.*—Pileo dimidiato umbrino plicato subtiliter rugoso; margine incurvo, hymenio fusco. No. 5412. New Eng. Sprague.

About $\frac{3}{4}$ inch long, umber; pileus lobed and plicate, with an incurved margin, minutely wrinkled, as if from contraction in drying, tomentose, becoming smooth; hymenium even dark brown. Probably of a soft coriaceous consistence when fresh.

233. **Stereum moricola.** *B.*—Pileo reflexo postice decurrente pubescente albido; hymenio fusco. No. 5997. On Mulberry. Car. Inf. Forming little round patches on bark, at length broadly reflexed, above pubescent, whitish; hymenium brown. In some respects resembling the last, but very different.

234. **Stereum Micheneri.** *B. & C.*—Rav. Fasc. iv., 12. Pileo coriaceo umbrino spongioso-tomentoso convexo lateraliter connato v. libero; hymenio lævi ochraceo nitido. No. 5413. New England, Sprague.

Apparently in one specimen consisting of a number of orbicular laterally confluent individuals, each attached by a central point without any stem, bright umber above, clothed with short spongy down; hymenium even, bright ochraceous. In other specimens, however, as No. 5806, New Eng., Sprague, and Rav. No. 1732. the habit is more that of *Thelephora biennis*, while in No. 3582, Penns. Michener we have a thick, corky dimidiate fungus. A very curious species.

235. *Stereum cristatum*. *B. & C.*—Parvum flabelliforme v. cyathiforme pallidum subzonatum, postice fibris pallidis cristatum. No. 2038. *Car. Inf. On Vitis*.

Some of the specimens are distinctly mesopodous, others merely flabelliform, pallid, zoned, minutely lineate, clothed behind, or at the base of the cup, with distinct cylindrical processes. Scarcely half an inch across; stem, when present, cylindrical, scarcely a line long.

A very curious little species, growing on dead vines in swamps. *Stereum striatum* and *S. complicatum* occur under many numbers.

* *Stereum molle*. *Lév.*—No. 49. *Car. Sup.* Lévillé's specimens were gathered in New York.

* *Stereum Pini*. *Fr.*—No. 6280, New Eng., Sprague.

* *Stereum papyrinum*. *Mont.*—*Rav. Fasc.*, ii., 36. *Rav. No.* 1140, 1176. On fallen logs. No. 3258. *Sartwell. Thel. crassa*, *Lév.* is either the same or is very closely allied.

* *Stereum subpileatum*. *B. & C.*—*Rav. Fasc. i.*, 30. *Hook. Kew. Misc. i.*, p. 238. Effusum crassum suberosum a matrice solubile supra sulcato-zonatum fulvum velutinum; hymenio ligneo-allido. No. 1007, 1062. *Car. Inf. Rav. No.* 787. Ohio, Lea. Spreading for several inches, extremely hard; upper surface, where it separates from the matrix, tawny brown, grooved and zoned, velvety; hymenium wood-coloured or nearly white.

* *Stereum bicolor*. *Fr.*—*Rav. Fasc. ii.* 33. No. 1596. *Rav. Santee River. No.* 4225, Penns., Michener.

* *Stereum fasciatum*. *Fr.*—No. 21. 194. *Car. Sup. No.* 2754. *Car. Inf.*

* *Stereum albo-badium*. *Fr.*—*Rav. Fasc. i.* 29.

* *Stereum Leveillianum*. *B. & C.*—*Rav. Fasc. ii.* 35. *Hook. Kew. Misc. i.*, p. 238. Sub Corticio. Effusum molle crassiusculum margine demum libero. No. 92, 1220, 917, 1127. *Car. Inf. On vine and oak. Carya and Cereis Canadensis.*

At first forming little peltate patches, which as they spread become closely attached to the matrix, of the colour of raspberries and cream. In age it becomes dead-white. Allied to *S. papyrinum*.

236. *Stereum sulfuratum*. *B. & Rav.*—Pileo reflexo lobato crispato sulfurato hispido subspungioso; hymenio pallido undulato. *Linn. Soc. Journ. x.*, p. 331. No. 1731, *Rav. On twigs of oak. Cotoosa Springs.*

At first orbicular, then more or less detached all round, clothed with spongy pubescence, tinged with yellow which, however, sometimes vanishes in dried specimens; hymenium pallid. Occurs also in Cuba and Venezuela.

237. *Stereum bizonatum*. *B. & C.*—Longitudinaliter effusum utrinque reflexum pallidum subtiliter tomentosum bizonatum; hymenio è rufo fusco; margine albido. No. 1924. *Car. Inf.*

Running for several inches along sticks, reflexed on either side, entire or lobed, pale umber, minutely tomentose, with about two zones; hymenium rufous in the younger parts, brown in the centre, extreme edge nearly white, next to which is a rufous zone.

238. **Stereum coffeatum.** *B. & C.*—Primum orbiculare dein postice decurrens antice reflexum zonatum umbrinum rugosulum coriaceum; hymenio pallido. No. 2923. On Oak. Rav. 901. A fine species, resembling somewhat *S. bicolor*.

At first orbicular, then decurrent behind, broadly reflexed above, coffee-coloured, zoned, marked with minute radiating wrinkles, very minutely pubescent, repeatedly zoned; hymenium ochraceous.

239. **Stereum Curtisii.** *B.*—Rav. Fasc. iii., 26. Effusum, primum orbiculare ferrugineum; margine tenui subbyssosideo pallidior, quandoque utrinque libero; hymenio rugoso. No. 353. Car. Sup. 1008, 1646. Car. Inf. No. 1683. On *Clethra*. No. 6040. On *Ribes aureum*.

At first orbicular, ferruginous, with a paler, somewhat byssoid margin, then effused; edge sometimes free on either side; hymenium more or less rugose; when perfect of a brighter or duller ferruginous tint.

This species connects *Stereum* very closely with *Hymenochaete*. The following numbers belong to forms of the same species, No. 411, 870, 1090, 2367. Car. Inf. No. 5355. New Eng., Sprague. No. 4548, Alabama, Peters. No. 3968, Penns., Michener.

240. **Stereum umbrinum.** *B. & C.*—Subimbricatum suprabreviter reflexum; margine subiculoque luteis spongioso-tomentosis; hymenio umbrino. Car. Inf. Ravenel.

Very narrow, somewhat imbricated; upper margin and mycelium of a spongy tomentose texture; hymenium dark umber; sometimes entirely resupinate.

* **Stereum sulfureum.** *Fr.*—Rav. Fasc. iii., 28. Rav. No. 1397. On bark of standing trunks of *Quercus alba*. Occurs also in Cuba and Ceylon.

241. **Stereum dissitum.** *B.*—Parvum pallidum, primum orbiculare; margine elevato tomentoso; hymenio ex albo, ochraceo subfuscescente. No. 3903. Texas, C. Wright. On dead wood.

Forming little orbicular, pallid patches, with an elevated tomentose margin; these at length become laterally confluent, with the margin free, but more depressed; hymenium pulverulent, varying from white or ochraceous to a pale brown tint.

242. **Stereum versiforme.** *B. & C.*—Fuscum primum orbiculare; margine tenui elevato, hymenio hic illic papillato. No. 4265. Penns., Michener. On dead sticks.

Bright brown, at first pezizæform, with a thin elevated margin, then laterally confluent; hymenium somewhat papillate.

* **Stereum frustulosum.** *Fr.*—Rav. Fasc. ii. 34. No. 195, 200, 595. Car. Sup. No. 4371. Penns., Michener.

* **Stereum acerinum.** *Fr. var. nivosum.*—Rav. Fasc. ii., 37. No. 1566. On *Juniperus virginiana*. Car. Inf. Rav.

* **Stereum candidum.**—Rav. Fasc. i., 32. *Schwein. sub Thelephora*, No. 3689. Car. Inf.

* **Hymenochæte rubiginosa.** *Lév. Ann Sc. Nat. Fér.*—1846. No. 1850. Rhode Island, Olney. No. 1470. On oak. No. 2421. On Ilex. Car. Inf. Rav. No. 1777.

* **Hymenochæte attenuata.** *Lév.*—New Orleans. Drummond.

* **Hymenochæte tabacina.** *Lév.*—No. 5299, 5853. New Eng., Sprague. Artic. Am. Drummond.

* **Hymenochæte avellana.** *Lév.*—No. 5859. New Eng., Sprague.

* **Hymenochæte badio ferruginea.** *Lév.*—New York.

* **Hymenochæte crocata.** *Lév.*—No. 4416. Car. Sup.

243. **Hymenochæte cervina.** *B. & C.*—Irregularis resupinata umbrino-cervina; margine tenuissimo concolore. No. 5090. Car. Inf. On rough bark. No. 2308. On oak. Car. Inf. x

Forming a thin dark fawn-coloured stratum, the edge of which is very thin, and of the same colour, but paler. Sometimes the border is narrower and shortly byssoid. Closely resembling some resupinate states of *Stereum Curtisii*.

244. **Hymenochæte corticolor.** *B. & Rav.*—Rav. Fasc. iii, 30. Irregularis dura lignea coffeæ-color demum hic illic liberata. Rav. No. 1553. Car. Inf.

On the rough bark of old elms. Forming irregular patches of a coffee brown, hard, woody, either entirely resupinate or with the edge here and there slightly raised. Closely allied to *H. dura*, *B. & C.* a Cuban species of a far brighter tint. x

* **Hymenochæte corrugata.** *Lév.*—Rav. Fasc. v., 26. No. 3709. On oak. Car. Inf. No. 4264. Penns., Michener. Ohio, Lea.

245. **Hymenochæte insularis.** *B.*—Tota resupinata rubiginosa, primum orbicularis; margine angusto tomentoso candido; hymenio rimoso. No. 4456. On *Castanea Vesca*. x

At first orbicular with a narrow white tomentose margin, under surface white; at length laterally confluent, ultimately continuous. As in *Polyporus igniarius*, the mycelium which penetrates below the thin bark is white.

246. **Hymenochæte setosa.** *B. & C.*—Læte ferruginea, continua, resupinata, setis eximiis exasperata. No. 4547. On oak. Alabama, Peters. x

Widely spread, or a bright ferruginous; hymenium rough with fascicles of setæ.

* **Corticium ochroleucum.** *Fr.*—No. 2169. On pine. Car. Inf. Rav. Fasc. iii., 33. ↓
x

Var. erimosum.—Hymenio continuo. No. 1763. On pine. Rav., 1521. Sulphur springs. Car. Sup. No. 1286. On Myrica. Car. Inf., 494. Car. Inf. No. 5214. Alabama, Peters. No. 4528. On *Lanrus sassafras*. Alabama, Peters, connects the two. No. 5381. New Eng., Murray, is a cucullate form with a continuous hymenium, but the specimens are small. Rav. No. 5772.

Formerly *C. spumeum*, B. & R. On oak limbs. Appears to be a resupinate ambient condition of the normal form.

* *Corticium evolvens*. *Fr.*—No. 5825, 6209. New Eng., Sprague. No. 5207. Alabama, Peters. On Liquidambar.

Appears to be a variety with a tawny hymenium.

247. *Corticium Nyssæ*. *B. & C.*—Adnatum, pileo utrinque reflexo ochroleuco velutino; margine inflexo; hymenio lævissimo lætiori. No. 3486. Penns., Michener. On branches of *Nyssa*.

Spreading for some inches in length, 2 inches across, broadly reflexed; pileus with a deep groove, ochraceous velvety, margin, at least in the dry plant, incurved; hymenium very even, and continuous, of a redder tint.

248. *Corticium Oakesii*. *B. & C.*—Rav. Fasc. iii., 32. Primum pezizæforme margine erecto inflexo candido tomentoso, demum confluent; hymenio pallide cervino. No. 3102. New Eng., Oakes. No. 1827. Rhode Island, Olney. No. 3868. Alabama, Peters. No. 3995. New York, Sartwell.

At first looking like a little *Cyphella* or *Peziza*. Externally white and tomentose, with an incurved margin, then confluent, but always detached all round. Hymenium pale, fawn-coloured; spores obovate. A very distinct species. A very similar, if not identical species, occurs in the Neilgherries.

249. *Corticium deglubens*. *B. & C.*—Tenue papyraceum secernibile subtus candidum; hymenio lævissimo ochraceo. No. 4557. On Juniper. Alabama, Peters.

At first resupinate, with a very narrow white byssoid margin, soon detached, white beneath, like kid leather; hymenium honey-coloured, very even and continuous.

* *Corticium salicinum*. *Fr.*—No. 3464. New York, Sartwell. Spores oblong, sausage-shaped. Formerly sent out as *Exidia cinnabarina*.

250. *Corticium auriforme*. *B. & C.*—Auriforme; pileo zonato postice albido rugoso glabrescente, antice umbrino velutino; hymenio rimoso ex ochraceo rufo. No. 2380. Car. Inf. On oak.

Pileus ear-shaped 1½-2 inches across; dirty-white behind, rugose, and nearly smooth, zoned in front; the extreme edge umber, velvety. Hymenium at first ochraceous, then rufous, cracked, the cracks at first radiating.

SEXUAL REPRODUCTION IN THE MUCORINI.

By DR. ANT. DE BARY.

To the phenomena of fecundation already described is immediately related the copulation of the *Mucorini*, which has, as yet, only been observed in two species of this family. The filaments which conjugate in *Rhizopus nigricans* are solid, rampant tubes, ramified without order, and confusedly intermingled. Where two of these filaments meet, each of them pushes towards the other an appendage which is at first cylindrical, and of the same diameter as these filaments themselves. From the first these two processes are firmly applied to each other by their extremities; they increase in size, become clavate, and constitute together a fusiform body placed across the two conjugated filaments. Between the two halves of this body there exists no constant difference of volume, and often they are perfectly equal. In each there is an abundant protoplasm, and when they have attained a certain development, the largest extremity of each is isolated by a septum from the clavule, which thus becomes the support or suspender of the copulative cell. The two conjugated cells of the fusiform body are generally unequal; the one is a cylinder as long as broad, the other is disciform, and its length is only equal to half its breadth. The primitive membrane of the clavule forms a solid partition between the copulative cells, which is composed of the two lamellæ; but soon after these cells become defined the medial partition is pierced in the middle, and soon disappears entirely, so that the two twin cells are confounded in one single zygospor, that is to say, in one organ of multiplication, which is due to the union of two more or less similar utricles. After its formation the zygospor still increases considerably in size, and acquires a diameter of more than one-fifth of a millimetre. Its form is generally spherical, flattened on the faces, which are attached to the suspenders; or it imitates a slightly elongated cask. The membrane thickens considerably, and consists, at the time of maturity, of two superimposed teguments; the exterior or epispor is solid, of a blackish-blue colour, smooth on the plane faces in contact with the suspenders, but covered everywhere else with thick warts, which are hollow internally; the endospor is thick, composed of several layers, without colour, provided with warts corresponding to those of the epispor. The contents of the zygospor consist of a large grained plasma, in which large drops of an oleaginous liquid often float. While the zygospor is increasing in size the suspender of the smaller copulative cell becomes a rounded and stipitate utricle, often divided at the base by a partition, and which attains almost the size of the zygospor. The suspender of the larger copulative cell preserves its primitive form and becomes scarcely any larger. It is rarely that there is not a considerable difference in size between the two conjugated cells and the suspenders.

The phenomena of copulation in Ehrenberg's celebrated *Syzygites megalocarpus* offers the same essential characteristics as in the *Rhizopus*, as I have elsewhere shown in detail;* the structure of the ripe zygosporos is also the same in the two plants. In *Syzygites*, however, the copulative cells and the suspenders do not habitually differ in volume in any sensible manner, and the generative clavules are formed between the branches of an upright, and regularly bi—or—trichotomous carpophore. I have also observed in the *Syzygites* a fact which the *Rhizopus* has never presented to me—the copulative cells of the former often cover the whole structure of the cells without uniting to each other, and then constitute what might be called azygosporos. The germination of the zygosporos and azygosporos has hitherto been observed only in the *Syzygites*. If, after a certain time of repose, these bodies are placed in a moist substratum, they emit a germ-like tube like the spores, with hard and resisting sides, and this germ, without giving birth to a proper mycelium, develops at the expense of the nutritive materials stored in the zygosporos, into an arbuscle or carpophore, which is branched bichotomously many times, charged with terminal sporangia characteristic of the species.

NOTES ON THE ABOVE.

By M. M. TULASNE. †

In the chronological order of observations and discoveries relative to this subject, the fungi which demand to be first quoted are the moulds, for it is amongst them that M. Ehrenberg's *Syzygites megalocarpus* is grouped. Until lately the remarkable phenomenon of copulation presented by this plant appeared to belong to it alone, and there was no analogy in the vegetable kingdom except with the conjugation of certain fresh-water Algæ. M. M. A. Janowitsch and de Bary discovered that *Rhizopus nigricans*, Ehb., also possesses zygosporos, ‡ and have thus once more, though indirectly, demonstrated that Ehrenberg's celebrated fungus is in all respects a true *Fungus mucoreus*.

The opinion formerly § expressed by us that *Aspergillus maximus* Lk. (*Sporodinia grandis*) is only one of the forms of *Syzygites megalocarpus* Ehb. has been fully confirmed by the observations of M. M.

* "Beitrag zur Morphologie und Physiologie der Pilze," part i. (1864) p. 74, &c.

† Translated from *Annales des Sciences Naturelles*. 5th Series (Oct., 1866), p. 211. By the Editor.

‡ De Bary. *Beitr. zur Morph. und Phys. der Pilze*, pt. 2 (1866), p. 28.

§ *Comptes Rendus de l'Acad. des Sciences*. Vol. 41 (1855), p. 617.

Schacht* and de Bary† so that the latter no longer hesitates to qualify *M. Ehrenberg's* fungus as *Mucor Syzygites*, and associates with it not only *Rhizopus nigricans*, Ehr., or *Mucor stolonifer*, Ehr., and *Mucor mucedo*, Fres., but also *Phycomyces nitens*, Kze., and *Mucor macrocarpus*, Corda, and *Mucor fusiger*, Lk.

We shall be careful not to criticise these associations, especially after having stated, as we have done this year, that the zygosporos show themselves not only in *Mucor Syzygites* and *M. stolonifer*, but also in *M. fusiger*. We have met with this latter species finer and larger than all the others in the woods of Chaville, near Versailles; it was living on *Agaricus fusipes*, Bull., which was decayed and partly destroyed. Its mycelium is remarkable in that some of its branches, stronger and more rigid than the others, bear small short spiniform divergent branchlets in imperfect verticels close together. The hyphasma in contact with the nourishing substratum, or buried within it, is a very dense anastomosing network, which in aspect and habit are quite different from the branched filaments, barely separate and very unequal, which constitute the upright fertile tufts of the *Mucor*. The spores, which are formed in great numbers in each terminal conceptacle, are oblong-oval, and rather unequilateral, not less than $\cdot 032\text{--}\cdot 035 \times \cdot 017\text{--}\cdot 019$ m.m. in size.‡

The globular zygosporos measure about $\cdot 18\text{--}\cdot 2$ m.m. in diameter; they are very brown, almost black, but instead of presenting a verrucose surface, like the zygosporos of *Mucor Syzygites* and *M. stolonifer* they are only finely striated, and one would say that their membrane was composed of very thin bands in juxtaposition. It is not rare to find two of them soldered together. Under their exterior or striated tegument, which is only the membrane of the conjugated cells from whence they come, two smooth coats which are slightly tinted with a brownish colour can be distinguished. The middle coat, which is easily exposed, is a very thick membrane of horny appearance, which imbibes water and speedily softens.

* See "Gazette de Cologne" of 1st June, 1864, for the account of the meeting held at Bonn on the previous 7th April by the Societe de medecine et d'hist. Nat. du Bas-Rhin. M. Schacht was unable to assure himself positively that the zygosporos of the *Syzygites* were produced upon the identical mycelium which bears the fertile cymes of *Sporodinia grandis*, Lk., but he has seen that the germ filament which these zygosporos issue in spring divides into dichotomous branches terminated by conceptacles which are exactly like those of *Sporodinia*, provided with an abundant mycelium.

† The principal observations of M. de Bary on the *Syzygites* were also published in 1864 (Beitr. z. Morph. u. Phys. der Pilze i., p. 74—88). They agree entirely with those of M. Schacht. In sowing the ascogenous spores of the *Sporodinia* M. de Bary obtained a mycelium as fertile in conceptaculiferous cymes as in zygosporos, but he observed that habitually the two sorts of fructification arise from different, or more or less distinct filaments, although these are the issue of the same mycelium; he therefore declares that there is perhaps no fungoid species more fit than the *Syzygites* to demonstrate the presence of two genders of fruit in one and the same fungus.

‡ These dimensions are less than those indicated by M. de Bary, according to whom the spores of *Mucor fusiger*, Lk., measure $\cdot 05 \times \cdot 012$ m.m.

During germination this coat sensibly loses its thickness. The interior utricle, which is thin, then swells, and bursts its two envelopes in order to elongate into an upright tube of uniform diameter, and which remains simple. This tube is obtuse, and at first continuous, but it finally exhibits some transverse partitions, especially towards its base, and it swells at its summit into a large globular conceptacle filled with spores identical with those of the adult and perfect plant. It does not appear that the zygospores directly produce a mycelium, at least we have not observed that they emit any branches at their base. Similar things take place in the germination of the zygospores of *Mucor Syzygites*, as M. M. Schacht and de Bary have reported. From this fact it would result that the zygospores of the *Mucorini* represent a life incapable of being continued without change of form, at least in the first generation, and that the *Mucors* possess at least two alternating modes of reproduction.

ON THE RARER LICHENS OF BLAIR ATHOLE.

By the REV. J. M. CROMBIE, M.A., F.L.S.

The district of Blair Athole occupies the N.W. portion of the Highlands of Perthshire, and is traversed by the central chain of the Grampians. Though a few species of lichens appear in some of the older British Herbaria from Ben-y-gloe, the highest ridge of mountains in the district, yet it would not appear until recently to have been systematically explored by any lichenist. The following record of the rarer species—many of them new to science, and others elsewhere extremely rare in Great Britain and Ireland—which I collected during a few weeks spent in the district in the autumns of 1870-1, will suffice to show how rich it is in this class of our Cryptogamic Flora. The majority, as will be seen, are from three localities, viz.—Craig Tulloch, a low-lying hill south of the village of Blair, some 900 feet high; Cairn Gowar, the loftiest of the Ben-y-gloe mountains, 3,690 feet in height; and from Glen Fender, N.W. of the village, and about half way between the two preceding.

1. *Pyrenopsis fuscata*. NYL.—Very sparingly on a quartzose boulder, in a stream on Cairn Gowar.

2. *P. lecanopsoides*. NYL.—Very rare on moist calcareous rocks of Craig Tulloch, with the spores but seldom well developed.

3. *P. Schæxerii*. (MASS.) Here and on dry calcareous rocks of Craig Tulloch, with both thallus and apothecia very well developed.

4. *Collema auriculatum*. var. *pinguenscens*. NYL.—“Thallus thicker, lobes more divided.” Rather scarce, on shady calcareous rocks of Craig Tulloch, amongst decayed mosses.

5. **Obryzum dolichoteron.** NYL.—Parasitic on the preceding, and very rare. N.B. The genus *Obryzum*, being now ascertained to be entirely parasitic, must be removed from the *Collemai*.

6. **Calicium citrinum.** LEIGHT.—Extremely rare on the thallus of *Lecidea lucida*, on walls in Glen Fender.

7. **C. byssaceum.** FRIS.—On decaying branches of alder, by the side of the Garry, probably not unfrequent, though but very sparingly gathered.

8. **Coniocybe furfuracea. var. fulva.** (L.) FRIS.—Along with the type on dead stems of *Rosa camina*, in crevices of walls at base of Craig Tulloch.

9. **Alectoria nigricans.** ACH.—Plentiful on Ben-y-gloe, descending to a comparatively low altitude.

10. **A. Lanata** (L.) and **var. parmelioides.** CROMB.—On rocks near the summit of Ben-y-gloe, sparingly and infertile. N.B. *Ramalina polymorpha* var. *emplexa*, from Craig Tulloch in Leight, Lich. Fl. S. p. 475, was gathered, I suspect, in Braemar. The Craig Tulloch plant in all probability being *R. subfarinacea*, Nyl. Common in many maritime and montane tracts.

11. **Peltidea aphthosa.** (L.)—Plentiful and well fruited amongst mosses on a turf-covered wall by the banks of the Garry.

12. **Physcia pulverulenta var. muscigena.** (WHLNB.)—Very rare and infertile on decaying mosses near the summit of Craig Tulloch.

13. **Pannaria nigra* triseptata.** NYL.—Apparently rare and infertile, though readily recognised from the type by the character of the thallus.

14. **Squamaria gelida f. dispersa.** CROMB.—“Thallus diffract, scattered.”—On stones of wall on Craig Tulloch, very sparingly.

15. **Sq. saxicola var. versicolor.**—Rare on rocks on Craig Tulloch. Not to be confounded with states of *Sq. galactina*.

16. **Placodium callopismum var. plicatum.** WEDD.—Sparingly on a wall near the village of Blair.

17. **Pl. chalybæum.** (OCF.)—Abundant and very fine. On calcareous rocks on the S.E. brow of Craig Tulloch.

18. **Lecanora cerina var. stillicidiorum.**—Amongst mosses on Craig Tulloch, sparingly, associated with other lichens.

19. **L. subfusca var. spodophæoides.** NYL.—Sparingly on micaceous stones of a shady wall near the base of Craig Tulloch.

20. **L. atrynea var. melacarpa.** NYL.—Very sparingly on micaceous stones of a wall high up on Craig Tulloch.

21. **Lepiniperda.** KRB.—Rare on old larch pales in Glen Fender, but probably overlooked elsewhere.

22. **L. glaucocarpa f. conspersa.** FRIS.—“Apotheciis minoribus.” Sparingly on a boulder amongst heath on Craig Tulloch.

23. *L. leucophæa* var. *conglobata*. FLOT.—On quartzose boulders near the summit of Cairn Gower, sparingly.

24. *L. epanora*. ACH.—Here and there, but infertile, on stones of walls, as in Glen Fender.

25. *L. epulotica*. (ACH.)—"Apotheciis rosellis."—On moist rocks of Craig Tulloch, not to be confounded with *L. lacustris*, With.

26. *L. verrucosa*. (ACH.)—Here and there on decayed mosses near the top of Craig Tulloch.

27. *L. poriniformis*. NYL.—Very rare, only a single specimen having been observed on schistose stones of a wall on Craig Tulloch.

28. *L. rubra*. (HFFM.)—Plentiful and in fine condition in one or two places of the steep rocks of Craig Tulloch, on decayed mosses.

29. *Pertusaria Westringii*. (ACH.)—Rare, and with apothecia not sufficiently developed, on boulders of Craig Tulloch.

30. *Lecideia lucida*. (ACH.)—Plentiful and well fruited on stones of walls in Glen Fender—f. *theiotea*, on a putrid trunk near the Falls of Tummel.

31. *L. coarctata* (ACH.) and its forms *glebulosa*, *elacista*, *ornata*, on walls of Craig Tulloch, sparingly.

32. *L. turgidula*. (FRS.)—On old pales at Pass of Killiecrankie, and var. *pityophila*. SMMRF. on larch pales, Glen Fender, sparingly. N.B. *L. endopella*, Leight, is another variety of this species, having the hymeneal gelatine intensely blue with iodine.

33. *L. misella*. NYL. = *L. Melanochroza*, Leight.—Very sparingly on decaying larch pales near Loch Tummel.

34. *L. enclitica*. NYL.—Very sparingly on old pales at Pass of Killiecrankie, but probably overlooked elsewhere.

35. *L. syncomista*. FLK.—Plentiful on the ground in crevices of rocks on Craig Tulloch.

36. *L. metamorphea*. NYL.—Extremely rare, and seen only on one stone of wall in Glen Fender.

37. *L. subnigrata*. NYL.—On schistose stones of wall on Craig Tulloch, very sparingly gathered.

38. *L. sublatypea*. LEIGHT.—Not uncommon on micaceous stones of walls on Craig Tulloch and in Glen Fender.

39. *L. aromatica*. ACH.—Very sparingly associated with *Paunaria nigra*. On calcareous rocks of Craig Tulloch, and confluent with *L. squamulosa*, Deak.

40. *L. limosa*. ACH.—On the ground towards the summit of Cairn Gower, but sparingly.

41. *L. silacea*. ACH.—Pretty common and very fine on micaceous stones of a wall in Glen Fender.

42. *L. mesotropa*. NYL.—Very rare, only a single specimen having been seen on a wall on Craig Tulloch.

43. *L. mesotropoides*. NYL.—Like the preceding, gathered only very sparingly in the same locality.

44. *L. plana*. LAHM. = *L. lithophiloides*. NYL. — Olim in litt. Sparingly on old walls in Glen Fender, "thallus thin, rimose, greyish-white, evanescent."

45. *L. sarcogyniza*. NYL.—Athalline on quartzose boulders, near the summit of Cairn Gowar. N.B. The true thallus of this species, which I have recently detected at hill of Ardo is "subdeterminate, thickish, rimoso-areolate, or somewhat continuous, sordid, greyish."

46. *L. aglæa*. var. *Crombiei*. JONES.—Plentiful on boulders on the N.E. brow of Craig Tulloch.

47. *L. subfurva*. NYL.—Not uncommon on micaceous stones of walls on Craig Tulloch and in Glen Fender, but often sterile.

48. *L. confusula*. NYL.—Very sparingly gathered on micaceous stones of a wall on Craig Tulloch.

49. *L. nigro-glomerata*. LEIGHT.—Not uncommon on quartzose stones on the summit of Cairn Gowar, but rather a *Lecanora* than a *Lecidea*, closely allied to *L. leucophæa*, and probably but a subspecies of that very variable lichen.

50. *L. Gevrensis*. TH. FOS. var. *prolata*. NYL.—Extremely rare, on quartzose stones on summit of Cairn Gowar.

51. *L. deparcula*. NYL.—Like the preceding, very rare, in the same habitat and locality, only a single small specimen having been found.

52. *L. lugubris*. SMMRFT.—Plentiful on micaceous stones of walls on Craig Tulloch and in Glen Fender, but with the thallus often sterile.

53. *L. atrobadia*. NYL.—Very sparingly gathered on a quartzose boulder, near the summit of Cairn Gowar.

54. *L. lenticularis*. ACH., and its var. *rhyparocarpa*. NYL.—On rocks of Craig Tulloch, sparingly.

55. *L. ocellata*. FLK.—Apparently rare, having been seen only on a single boulder of Craig Tulloch.

56. *L. citrinella*. ACH.—Very rare, on turfy soil, on a wall of Craig Tulloch.

57. *Xylographa parallela*. (ACH.)—Plentiful on old pales at Pass of Killiecrankie; var. *pallens*, f. *alliptica*. Nyl. Very sparingly in the same locality.

58. *Lithographa tesserrata*. (D.C.)—Extremely rare, only a single specimen having been seen on a small fragment of a calcareous stone amongst detritus on the summit of Cairn Gowar.

59. *Opegrapha Turneri*. LEIGHT.—On the trunks of ash at base of Craig Tulloch, probably frequent.

60. *O. confuens*. (ACH.)—Apparently rare on calcareous rocks of Craig Tulloch.

61. **Verrucaria pyrenophora.** ACH.—Sparingly gathered on calcareous rocks of Craig Tulloch.

62. **V. integra.** NYL.—Plentiful on calcareous rocks of Craig Tulloch.

63. **V. spilobola.** NYL.—Very rare, on calcareous stones of Craig Tulloch, only a single specimen having been gathered.

64. **V. Epipolytropa.** MUDD.—Sparingly on the thallus of *Lecanora polytropa*, on walls of Craig Tulloch.

65. **Melanotheca gleatinosa.** (CHEV.)—Apparently common on the trunks of young alders, by the side of the Garry, associated with *Verrucaria rhyponota*.

Of the above 65 lichens, eight are new species, as yet found only in this district, seven are new varieties and forms ; while, exclusive of these, seven others are now for the first time recorded as British. A further exploration of the district would, no doubt, bring other varieties to light, as my attention was directed chiefly to those localities in which primary limestone is associated with mica, slate, and quartz,—a geological combination which always yields the Lichenist, everywhere throughout the Grampians, a rich and rare harvest. *e.g.*, Ben Lawers, Movione, Crag Guie, &c. Many other interesting species were met with, and many which might have been expected to occur, such as *Parmelias* and *Stictas*, were but few in number. To those interested in the geographical distribution of our British Lichens, I may state that there is a marked contrast in many respects between the Lichen-flora of the Central Grampians in Blair Athole and that of the S.W. Grampians in Braedaldane, as also between it and that of the N. Grampians in Braemar.

BRITISH FUNGI.

By M. C. COOKE.

(Continued from p. 156.)

Sphæria (Immersæ) parallela. Fr. “Parallel Sphæria.”

Immersed, black ; perithecia globose, disposed in lines ; ostiola rather prominent, crowded, globose, even. Asci subcylindrical ; sporidia linear, obtuse, straight, or curved, uniseptate, pale brown.—Fries, *Ex.*, No. 3. Fries *Sys. Myc.*, ii. 373. *Sphæria linearis*. Grev. in *Herb. Ed.*

On decorticated pine wood. Scotland. (Dr. Greville.)

The specimen, on the authority of which this species is recorded as British, is in the Edinburgh Herbarium. It accords exactly with Fries's *Scler. Suec.* No. 3. Sporidia ($\cdot 0004$ in.) $\cdot 01$ m. m. long.

Sphæria (Obtectæ) rhodobapha. B. & Br. “Red Staining Sphæria.

Perithecia semi-immersed, compressed, ostiola papillæform ; the

matrix tinged with rose-colour. Asci clavate, sporidia fusiform, multinucleate.—*Berk. & Br. Ann. Nat. Hist.*, No. 1334, t. xxi., f. 29.

On dead decorticated branches. Apr.

Perithecia fragile, for the most part compressed and elongated, so as to approximate *Pertusæ* and *Macrostomæ*. The subjacent wood is tinged throughout with magenta pink. Sporidia with several nuclei ($\cdot 001$ in.) $\cdot 025$ m.m. long.

Sphæria (Obtectæ) mammillana. *Fr.* "Teat-like Sphæria."

Scattered. Perithecia hemispherical, rather prominent, covered by the blackened adnate cuticle; ostiola papillæform. Asci cylindrical; sporidia uniseriate, or biseriate, cylindrical, obtuse, brown.—*Fries Sys. Myc.* ii., 487.

On oak twigs. Castle Rising. (C. B. Plowright.)

Allied to *Sphæria clypeata*, N., with which it is associated by some authors. Sporidia very variable in length, sometimes pseudo-septate ($\cdot 0008$ – $\cdot 001$ in.) $\cdot 02$ – $\cdot 025$ m.m. long.

Ceratostoma Helvellæ. *Cooke.* "Peziza *Ceratostoma*."

Perithecia soft, membranaceous, ovate, smooth, pale brown, at first semi-immersed; neck scarcely equal in length to the diameter of the perithecia, ending in a somewhat erect fringe of hairs. Asci clavate, fasciculate, soon disappearing. Sporidia lemon-shaped, simple, dark-brown; epispore smooth.

On the hymenium of *Peziza hemispherica*. Eastbourne. (C. J. Muller.)

Sporidia $\cdot 0009$ – $\cdot 0001$ in. long, about two-thirds as broad. This belongs to Corda's genus *Melanospora*, which seems scarcely capable of separation from *Ceratostoma* of Fries.

Venturia atramentaria. *Cooke.* "Inky spot *Venturia*."

Hypophyllous, gregarious, forming irregular patches upon discoloured spots. Perithecia subglobose, clad with short, dense, patent hairs, black. Asci cylindrical; sporidia uniseriate, elliptic (probably septate when mature).—*Scottish Naturalist*, March, 1872. *Cooke, exs.*, No. 599.

On living leaves of *Vaccinium uliginosum*. Lochnagar. (Dr. B. White.)

Differs from *Venturia myrtilli* in the larger perithecia, gregarious habit, and shorter and denser hairs, as well as in other particulars.

Capnodium salicinum. "Willow *Capnodium*."

Forming a thin velvety black stratum; mycelium moniliform, the articulations containing a single nucleus. Peridia rather short, often obtuse, but sometimes lageniform and acuminate; sparingly forked, sometimes fringed. Asci broad, obtuse; sporidia oblong, slightly curved or oblique, oblong, triseptate, with one or two longitudinal septa, constricted at the articulations.—*Mont. Ann. Nat. Hist.*, 2nd ser. vol. iii., p. 520.—*Berk. Hort. Jour.* iv., p. 251. *Cooke exs.*, No. 596.

On leaves of willows. Near Eastbourne. (C. J. Muller.)

Chætomium griseum. *Cooke.* "Grey Bristle Mould."

Subgregarious or scattered, grey or cinereous; perithecium globose, brown, submembranaceous; hairs long, elastic, circinate, pel-

lucid, faintly and very rarely septate. Asci clavate, fasciculate; sporidia lemon-shaped, colourless; endochrome granular, or nucleate.

On old sacking. King's Lynn. (C. B. Plowright.) On old rag and paper. Highgate (M. C. C.)

The threads somewhat resemble those of *Chaetomium murorum*, but are stouter, less rigid, and more transparent, the sporidia are larger and colourless ($\cdot 0004\text{--}\cdot 0006 \times \cdot 00025\text{--}\cdot 00035$ in.) $\cdot 013\text{--}\cdot 017 \times \cdot 006\text{--}\cdot 009$ m.m.

Chaetomium funiculum. Cooke. "Twine Bristle Mould."

Perithecia scattered, sub ovate, black; hairs of the vertex very long, dichotomous or simple, erect, slender, acute, black; sporidia lemon-shaped, dingy-brown.—Cooke, *Microscopic Fungi*, 3rd Ed. App. p. 227.

On twine. British Museum. (W. Carruthers.)

This species is most closely allied to *C. elatum*, but much smaller and neater. It is wholly black, and without the fibrous base of *C. elatum*. The hairs are more delicate, and not half the diameter, and the sporidia are scarcely more than half as long or broad.

HOBKIRK'S "SYNOPSIS."

While I express my gratitude to Mr. Hobkirk, for his well-condensed and exceedingly handy "Synopsis of the British Mosses," the general accuracy of which is unimpeachable, I would at the same time call attention to an error into which he has been led, and which is likely to be propagated, unless corrected.

In Dr. Braithwaite's papers on "Recent Additions to our Moss-Flora," the discovery, in Britain, of *Seligeria tristicha* is ascribed to the Rev. J. M. Crombie; and Mr. Hobkirk, following Dr. Braithwaite, ascribes it to the same gentleman. Long ago, in the "Transactions of the Edinburgh Botanical Society," the discovery of this moss was assigned to Miss McInroy, a lady who has been very quietly but most successfully investigating the Moss-Flora of Athole, and whose important discoveries in that quarter are well known to Scottish botanists. The first specimens of *Seligeria tristicha* gathered in Britain, which Wilson saw or heard of, were those sent to him by Miss McInroy in 1859, and they were accompanied with *Seligeria pusilla*, and *Anodus* from the same quarter, but the first specimens gathered by Miss McInroy were gathered a year previously, i.e., in 1858.

I may also mention that I myself, not Mr. Hunt, as stated in the "Synopsis," was the first to make known the existence of *Webera Briedleri* as a British species, and that I gathered it in clover, &c., so early as 1867, though then I was not aware of the difference between it and *Bryum Ludwigii*.

New Pitsligo.

JOHN FERGUSON.

Peziza schizospora. Phillips.—The measurement of the sporidia in this species was incorrectly stated in the description. It should have been $\cdot 0007$ in.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By THE REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 150.)

* **Corticium giganteum.** *Fr.*—Rav. Fasc. ii., 38. No. 3659. Louisiana, Dr. Hale. Rav. No. 1244. On pine logs.

251. **Corticium polyporoideum.** *B. & C.*—Subiculo tomentoso candido marginem angustum formante; hymenio pulverulento, pallide alutaceo. No. 4559. Alabama, Peters.

Effused irregular; subiculum white, well-developed tomentose projecting beyond the pale tan-coloured pulverulent hymenium and forming a narrow border. Allied to *C. Dregeanum*. Mont. & B.

252. **Corticium siparium.** *B. & C.*—Subiculo spongioso tomentoso pallido; hymenio ochraceo demum fuscescente. No. 5239. Alabama, Peters. On *Liquidambar*.

Subiculum consisting of spongy pallid down; edge slightly turned up; hymenium at first ochraceous, gradually acquiring a brownish tint. If No. 6116, Alabama, Peters, is the same, the hymenium at length becomes much darker and cracks.

* **Corticium Auberianum.** *Mont.*—No. 2497. Car. Inf. On Carza. Rav. No. 1369. Ohio, Lea. No. 2030. Appears to be a white variety of the same species.

253. **Corticium venosum.** *B. & Rav.*—Late effusum; subiculo tomentoso; hymenio livido-pallido, e fibrillis subiculi parce et late reticulato. Rav. No. 1321.

Spreading widely; subiculum thin tomentose, consisting of interwoven threads; hymenium livid, but pale, marked here and there with wide reticulations, which appear to arise from the subiculum.

* **Corticium læve.** *Fr.*—No. 4517, No. 6101. Alabama, Peters. On *Liquidambar*, 6087. On oak. Rav. Fasc. ii., 59.

254. **Corticium Petersii.** *B. & C.*—Rav. Fasc. v., 28. Subiculo tenui tomentoso, pallido hic illic in fibrillas compacto; hymenio alutaceo hic illic lateritio. No. 4509. On the ground in moist places. Alabama, Peters.

Subiculum thin, pallid, tomentose, here and there forming creep-

ing fibres ; hymenium pale, tan-coloured, in parts tinged with brick-red.

255. **Corticium glabrum.** *B. & C.*—Subiculo radiante byssoideo cito evanido lateritio ; hymenio glabro nec velutino concolore. No. 2404, 3719. *Car. Inf.* On bark.

Subiculum where well-developed, radiating byssoid, but soon vanishing ; hymenium brick-red, smooth, not velvety, as in *C. velutinum*.

* **Corticium miniatum.** *B.*—No. 5252. Alabama, Peters. On *Liquidambar*.

* **Corticium cœruleum.** *Fr.*—*Rav. Fasc. iii.*, 27. No. 1570. Santee River. A very widely diffused species.

256. **Corticium chrysocreas.** *B. & C.*—*Rav. Fasc. v.*; 27. Subiculo parco flavo ; hymenio ex albido fulvo papillato. No. 2933. *Car. Inf.* 4027. Alabama, Peters. *Rav. No.* 1536. On pine.

Subiculum bright yellow, thin ; hymenium immarginate pallid, or yellow tinged with tawny.

* **Corticium viticola.** *Fr.*—*Rav. Fasc. iii.*, 34.

257. **Corticium crocicreas.** *B. & C.*—Subiculo amplo, tomentoso, laeteritio ; hymenio tenui flavo. No. 4542. On vine. Alabama, Peters.

Subiculum spreading widely, bright saffron yellow ; hymenium thin, more or less yellow. A curious species.

* **Corticium albido-carneum.** *Rav.*—*Fasc. iv.*, 14. *Thelephora*, Schwein.

258. **Corticium epichlorum.** *B. & C.*—*Rav. Fas. v.*, 24. Subiculo tenui viridi-luteo marginem angustum formante ; hymenio olivaceo umbrino demum rimoso. No. 4552, 6118. Alabama, Peters. No. 5240. *Al.*, Peters. On *Vaccinium*.

The two former are the normal condition. Subiculum thin, yellow-green, forming a slight margin ; hymenium olive-umber, at length cracked.

259. **Corticium filamentosum.** *B. & C.*—Subiculo molli tomentoso fibrilloso pallido ; hymenio pulverulento ochraceo, vel subolivaceo. No. 6119. Alabama, Peters.

Subiculum consisting of soft tomentose threads, over which the ochraceous or olivaceous pulverulent hymenium forms a thin stratum.

260. **Corticium ephebium.** *B. & C.*—Subiculo tomentoso pallido ; margine secernibili, velutino ; hymenio ex ochroleuco rufulo setuloso. No. 6050, 6088, 6089. Alabama, Peters.

Spreading widely. Subiculum tomentose ; margin becoming free, velvety, pale, umber ; hymenium setulose, as in *C. velutinum*.

261. **Corticium flavidum.** *B. & C.*—Subiculo obseleto ; hymenio e floccis repentibus ramosis apice sporas flavidas subglobosis botryoideas ferentibus. No. 4084. *Penns. Mich.* On decayed wood.

Subiculum obsolete ; hymenium consisting of branched creeping threads, each branch of which bears at the tip a cluster of dirty yellow subglobose spores.

262. **Corticium vagum.** *B. & C.*—Subiculo arachnoideo reticulato flavido subfulvo ; hymenio e floccis repentibus apice sporiferis enato, fibrillas ambiente. No. 3240. On pine.

Subiculum forming a reticulate spidery web, round the reticulations of which the hymenium is formed at the top of short processes ; varying from dirty white to pale tawny.

263. **Corticium olivascens.** *B. & C.*—Subiculo albo floccoso fibrillas hic illic emittente ; hymenio pulverulento olivaceo-luteo hic illic margine albo. No. 6392. Boston, Murray.

Subiculum consisting of white threads, which send out delicate filaments over the bark ; hymenium occasionally with a white border, pulverulent yellow-olive.

264. **Corticium prasinum.** *B. & C.*—Rav. Fasc. v., 29. Subiculo parco arachnoideo ; hymenio continuo tenui fragili prasino ; margine albo. No. 6080. Alabama, Peters. On the ground under Liquidambar.

Subiculum delicate spidery ; hymenium thin brittle continuous, with a white margin when young.

265. **Corticium chlorinum.** *B. & C.*—Tenue fragile olivaceum demum granulatum. No. 6109. Alabama, Peters. On Abies. Forming a thin, brittle, olive-green membrane, which is at first pulverulent, but afterward rough, with minute papillæ ; resembling such Thelephoræ as *T. laxa*, &c.

266. **Corticium hypopyrrhinum.** *B. & C.*—Subiculo pyrrhino marginem hic illic tenuissimum formante ; hymenio albido. Rav. No. 1704. Car. Inf. Apparently on vine.

Subiculum extremely thin rufous, sometimes forming a slight margin ; hymenium dirty white at first pulverulent.

267. **Corticium cervicolor.** *B. & C.*—Subiculo delicato byssoideo ; hymenioque cervinis. No. 4026. Alabama, Peters. On smooth wood. Fawn-coloured.

Subiculum very delicate byssoid, spreading over the wood, but scarcely forming a distinct margin ; hymenium of the same colour, scarcely pulverulent.

268. **Corticium martianum.** *B. & C.*—Rav. Fasc. v., 30. Subiculo tenuissimo fulvo ; hymenio croceo. No. 6251. Boston, Sprague. Forming little detached patches, very irregular in form. On rough wood.

Subiculum very thin, tawny, covered here and there with the saffron yellow hymenium. Allied to *C. peroxydatum*, *B. & Br.* A Ceylon species.

269. **Corticium dryinum.** *B. & C.*—Subiculo vix distincto ; hymenio crassiusculo rhabarbarino-ruf. No. 5204. Alabama, Peters.

On oak. Running over very rough wood, on which it forms an irregular stratum of a deep rufous tint, with a rhubarb-coloured velvety aspect.

* **Corticium calceum.** *Fr.*—Rav. Fasc. iv., 15. No. 2312. Car. Inf. No. 3914. Texas, C. Wright. No. 4263. Penns., Michener. On Vine. Rav. No. 1817. Car. Inf. On pine logs. No. 1797. On *Leucothoe coriacea*.

270. **Corticium hepaticum.** *B. & C.*—Latissime effusum; margine hic illic reflexo tenui subtus albedo; hymenio continuo hepatico. No. 5989. Penns., Michener. On ash.

Very widely effused, running over the rough wood, and surrounding any projecting point; edge thin, white beneath, here and there free; hymenium liver-coloured, with somewhat the aspect of that of *C. viscosum* or *C. lividum* when dry.

271. **Corticium tremellinum.** *B. & Rav.*—Tremelloideum albidum, siccum rufescens ambiens. Rav. No. 1649. Car. Inf. 1754. Cotoosa Springs, Georgia. No. 6393. Wisconsin, Lapham.

On the ground running over whatever it meets with. Dirty-white gelatinous tremelloid; rufous, hard and horny when dry.

272. **Vax. reticulatum.**—Fuciforme fasciculatum reticulatum. No. 3942. Penns., Michener.

Imitating in form *Podisoma macropus*, forming erect fucoid tufts, reticulated below.

273. **Corticium cremoricolor.** *B. & C.*—Mycelio albo innato; hymenio immarginato rimoso areolato, hic illic papillato. No. 5205. Alabama, Peters. On *Ilex*.

Mycelium white innate; hymenium cream-coloured when fresh, soon cracked into largish areolæ, here and there papillose.

274. **Corticium lilacino-fuscum.** *B. & C.*—Effuseum; margine angusto albo; hymenio lilacino fusco demum rimoso. No. 5610. C. Wright, Connect.

On smooth wood, over which it forms a thin stratum, with a narrow white border arising from the subiculum; hymenium lilac, tinged with brown, at first even and paler, then cracked, shewing the white subiculum. No. 5608. Conn., C. Wright. Appears to be a form of the same species, *Corticium pauperculum*, B. & C.

275. **Corticium molle.** *B. & C.*—Linn. Soc. Journ., p. 336. Rav. Fasc. iii., 29. Effusum immarginatum armeniaco-rufum; subiculo pallidiore; hymenio glaberrimo nitido. No. 2718, 2936. Car. Inf. 4869. On Vine. 5089. Alabama, Beaumont, No. 5186. Alabama, Peters. Also Cuba.

Subiculum pale, sometimes byssoid, rarely extending beyond the hymenium, which is very smooth, and even varying from apricot colour to deep rufous.

ON CYSTIDIA.

By M. ANTON DE BARY.*

In the *Hymenomycetes* the organs of the male sex have been the object of many researches. J. Hedwig† thought that he had found their seat in the ring, the striæ and scales of the stipe of pileate Fungi, and he took to be sexual organs the corpuscles accumulated on these several parts, but which, according to his own descriptions, could only have been the spores fallen from the hymenium.

Long before this Micheli had seen on the hymenium of a *Coprinus* particular vesicular organs, and he had perhaps also (for the fact does not seem to me without doubt) noticed the same vesicles in other *Agaricini*, as "apetalous flowers, naked and consisting only of a single filament." Bulliard, in his "Champignons de la France" (vol. i., p. 39—50), also considers these organs to be a sexual apparatus and a sort of spermatic vesicles. They have since been differently described by several authors. They are qualified as "cystidia" by M. Leveille, as "paraphyses" by M. Phœbus, but to Klotzsch and Corda‡ they are positively antheridia, anthers, or pollenidia. M. Hoffmann§ has more recently devoted a special memoir to them. They are found in the greater number of the fleshy *Hymenomycetes*, but, according to M. Phœbus, their presence is not constant in several species, such as *Agaricus lateritius* and *Ag. geophilus* and *Cantharellus aurantiacus*. It seems they have not yet been met with in the *Hydnei* and the *Clavariæ*. The hymenium of the *Hymenogastri* presents a few, and, doubtless, the paraphyses which I have noticed in *Geaster hygrometricus* are analogous to them. The cystidia are large cells which are especially recognized by their projecting, more or less, on the surface of the hymenium. They have besides the same direction and the same seat as the basidia. Their form and dimensions vary much according to the species under observation. They are generally constant and characteristic for each species, but they are less so for the genera or subgenera. Among the most remarkable of them we must especially mention the large cystidia which are thought to be common to all the *Coprini*, and which are oval or elongated cells, obtuse, and sufficiently large to be visible to the naked eye. In other cases the cystidia are cylindrical, clavate, lageniform, obtuse (in *Polyporus umbellatus* according to Corda, and *Agaricus viscidus*, L., according to Phœbus), pointed or capitate (in *Lactarius*, *Russula*, and *Boletus* according to Corda). The cystidia are simple, sometimes branched and cylindrical, capilliform,

* Translated from the 5th Chapter of De Bary's "Morphologie und Physiologie der Pilze."

† Theoria general, et fructif, Plant, Crypt.

‡ Icones Fungorum, vol. iii., p. 44.

§ Botanische Zeitung (1856), p. 137.

as in *Agaricus fumosus* P., *Agaricus laccatus*, Scop. and others. In *Agaricus pluteus*, P., they represent a kind of flask terminated superiorly by several short, pointed recurved appendages, which appear to me to be doubly hooked. Still more singular forms have been observed by the authors I have quoted.

The structure of the cystidia offers few peculiarities; in the greater part a delicate and colourless membrane surrounds sometimes a similarly colourless plasma, full of vacuoles, and sometimes a perfectly transparent liquid. I have observed in the hymenium of *Coprinus micaceus* which had not yet attained its maturity, that the cystidia enclosed a central plastic body, irregularly elongated, which sent in all directions towards the sides of the cell a multitude of filiform processes, branching and anastomosing amongst themselves. These processes changed their form with astonishing rapidity,* after the manner of the *Amœbæ*. The older cystidia were entirely transparent.

The contents of the cystidia of *Lactarius deliciosus*, and allied species, are granular and opaque. In this respect the cystidia resemble the laticiferous tubes or filaments, and often when a thick slice of the substance of the fungus is observed it seems that they are branches from these filaments, the more so since they bury themselves deeply in the web of the lamellæ, underneath the sub-hymenial tissue. Still I have never seen them spring except from filaments of the web deprived of latex, of which they seemed to be branches. The cystidia of *Agaricus balaninus*, Berk., are of a dark purple colour.†

According to Corda, and the uncertain opinions of anterior authors, the cystidia eject their contents under the form of a liquid drop and that by their summit, which is represented as open. I have not, any more than M. Hoffmann, been able to convince myself that this phenomenon is produced spontaneously. I have, indeed, only very rarely seen the cystidia burst in the water, which the same author says takes place very irregularly. If their surface is damp, and often bears liquid drops, this is a circumstance which is common to them with all fungoid cells that are full of juice.

The cystidia are developed in nearly the same time as the basidia. Sometimes they are dispersed without order amongst the latter; sometimes, and more generally, they are placed on the free edges of the prominences of the hymenium, and especially on the cutting of the lamellæ of the *Agaricini*. Their number is always less than that of the basidia, and often it is insignificant.

Those observers who have considered the cystidia to be male sexual organs have supposed that the ripe and detached spores of the basidia fastened themselves to the moist surface of these cystidia, to be there fecundated by the lubricating liquid.‡ If this

* See Ditmar in Sturm Deutschl. Flora, part iii., No. 1, pl. 28.

† See Montagne Organ. et Phys. de la Classe des Champignons.

‡ See Klotzsch in Dietrich Flor. Boruss., vol. vi., sub. *Coprinus deliquescens*.

entirely gratuitous opinion had foundation we should here have less to do with a real fecundation than with a phenomenon of nutrition. As far as I know, there exists no other observation on any female organ susceptible of fecundation by the cystidia, and the known facts fully authorize us only to see in them pilose productions of a particular order. Many cystidia have, in fact, just the form of ordinary cylindrical hairs, those of the *Coprini* have the greatest resemblance to the hairs spread over the sterile surface of the cap, and in many fungi we find positive pilose formations in the place where in others the cystidia are placed; it is sufficient to quote the edges of the tubes of *Fistulina*, and the setiform appendages which are prominent on the hymenial surface of several *Thelephoræ*, such as *Corticium quercinum* and especially *Thelephora* (*Hymenochæte*) *tabacina*, and other species of the group which constitute M. Leveillé's *Hymenochæte*;^{*} these appendages resemble, it is true, pollenidia, but their sides are everywhere hard and thick.

Quite recently M. A. S. Ærsted has discovered a trace of sexual organs in the Hymenomycetes where, perhaps, no one had previously looked for them.† He has seen, in fact, in *Agaricus variabilis*, Pers., oocysts or elongated reniform cells, which sprung up like rudimentary branches of the filaments of the mycelium, and enclose an abundant protoplasm, if not even a nucleus. At the base of these oocysts appear the presumed antheridia, that is to say one or two slender filaments which generally turn their extremities towards the oocysts, and which more rarely are applied to them. Then, without ulteriorly undergoing any appreciable modification, the fertile cell or oocyst becomes enveloped in a lacework of filaments of mycelium which proceed from that which bears it, and this tissue forms the rudiments of the cap. The reality of some kind of fecundation in this circumstance, and the mode of the phenomenon, if there is one, are at present equally uncertain. If M. Ærsted's opinion is confirmed, naturally the whole of the cap will be the product of fecundation. As long ago as 1860 M. Karsten presumed that such was the case. His observations on the first development of *Agaricus campestris*, as far as we can judge by the rather obscure account given in "Bonplandia" (1862, pp. 63), would agree with M. Ærsted. It is impossible not to perceive the similitude between the phenomena seen by M. Ærsted and those I have described in *Peziza confluens*.

* See Annales des Sciences Naturelles, 3rd series, vol. v. (1846), p. 150.

† See Verhandl. der Königl. Dan. gesell. der Wiss.: 1st January, 1865.

TWO BRITISH MOULDS.

By M. C. COOKE, M.A.

Verticillium agaricinum. (Bon.) "Agaric Verticillium."

White. Forming woolly tufts. Fertile flocci, septate, branched. Ultimate ramuli verticillate, three or four in a whorl, thickened below, attenuated upwards. Spores narrowly elliptical, obtuse, triseptate, hyaline. *Trichothecium agaricinum*, *Bonorden Handbk.*, p. 99, t. v. f. 114.

On decayed Agarics. Ken Wood, Highgate. Autumn.

This mould agrees very closely with Bonorden's figure, and, unless the genus *Verticillium* is to be restricted to such species as have simple spores, it offers no features which would warrant its removal to another genus. The snow-white threads form a dense cottony stratum, covering the decayed Agaric.

Ædocephalum roseum. Cooke. "Roseate Ædocephalum."

Rose-pink. Effused, or in minute punctiform tufts, collected together in irregular patches. Threads equal, head subglobose, spores ovate or oval, smooth, attached by a slight apiculus. *Cooke, exs. No.* 550.

On old paper and rags. Millfield Lane, Highgate. Autumn.

This is closely allied to *Ædocephalum laticolor*, B. & Br., but differs in colour, as well as in the form of the spores; features which seem to be sufficient to characterize it as a distinct species. The tufts are very minute, scarcely visible to the naked eye, except as forming an effused rosy patch sometimes an inch or more in diameter, on the discoloured matrix.

FUNGI FROM STOVES.

In the Journal of Botany for March, 1873, Mr. Worthington G. Smith has given descriptions of several new species of Hymenomycetous Fungi, which he has met with from time to time in stoves. These are doubtless of exotic origin, and although developed in Britain, can scarcely be grouped with truly indigenous species. Two coloured plates accompany the descriptions, which include the following :—

Agaricus (Pleurotus) gadinioides—on tree-fern stems (t. 129, f. 1-4).

Agaricus (Naucoria) echinosporus—in orchid house (t. 129, f. 5-9).

Marasmius subulatus—in dense patches on tree-fern stems (t. 129, f. 10-15).

Marasmius aratus—on tree-fern stems (t. 129, f. 16-20).

Radulum Cyathæ—on tree-fern stems (t. 130, f. 5-8).

Clavaria cervina—on and about tree-fern stems (t. 130, f. 9).

Pistillaria purpurea—(t. 130, f. 10-12).

Amongst known exotic species, Mr. Smith cites the elegant *Polyporus xanthopus*, Fries., as having occurred on old wood at Bull's nursery.

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Grevillea,

A MONTHLY RECORD OF

CRYPTOGAMIC BOTANY

AND ITS LITERATURE.

EDITED BY M. C. COOKE, M.A.

*Author of "Handbook of British Fungi," "Rust, Smut, Mildew, and
Mould," &c., &c.*

VOL. II.

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Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY
AND ITS LITERATURE.

NEW BRITISH ALGÆ.

By E. M. HOLMES.

Callithamnion hormocarpum. *N. S.*—*General characters* : Frond capillary, densely tufted, 1-2 inches high, of a pinkish purple colour. Stems not glossy ; as thick as bristle below, becoming as fine as silk above. Plumules alternately branched throughout.

Microscopical characters : Articulations at the base of the stem, coated with branched and jointed filaments ; articulation of the plumules, 6-8 times as long as broad ; those of the pinnæ four times, decreasing to twice as long as broad ; flexuose and attenuated towards the apex of the ultimate pinnules. Pinnules of the pinnæ either simple, once forked, or repeatedly forked, and tufted at the apex ; axils very narrow, so that the less-branched pinnules appear pinnate, and the more densely branched ones appear furcate.

Fructification of two kinds : 1st, Tufts of branched moniliform cells, of a darker colour than the cells of the frond, each cell surrounded by a hyaline border ; these tufts are situated on the rachis of the plumules and pinnæ, but are never formed from the terminal branchlets. 2nd, Elliptical cells, two or three in number, forming a whorl round and semi-immersed in, the upper part of the articulations of the plumules.

Both the tufts and the whorls of cells appear to contain granular matter, but show no appearance of being tetraspores.

This very remarkable plant bears some resemblance to *Seriospora Griffithsiana*, but differs from it in its want of gloss, different colour, in the moniliform cells never being terminal, and not formed from the branchlets, but an independent growth on the rachis, and in the presence of the whorled elliptical cells. It is interesting to find that there is a specimen in Mrs. Griffith's collection of Algæ belonging to the Linnean Society, which was gathered at Salcombe, in 1840, and which presents the same character of tufted cells, &c. This specimen is marked " *Seirospora* ?"

I have gathered the plant at Plymouth for two consecutive years, and it has always presented the same characteristics. It grows on Fuci at low water, on the Torpoint mudbank, and is thrown up on

the shore at the same time as *Seriospora Griffithsiana*. I once met with a specimen there which had elliptical lateral tetraspores, but it has been unfortunately lost.

EXPLANATION OF PLATE XI.

- 1.—The entire plant.
- 2.—Plumule magnified $\times 20$.
- 3.—Pinnule magnified $\times 100$ { *a.* 2 elliptical cells on rachis of plumule.
 b. 3 ditto on ultimate branchlet.
- 4.—Tuft of moniliform cells.
- 5.—Portion of base of stem showing the coating of branched and jointed filaments.

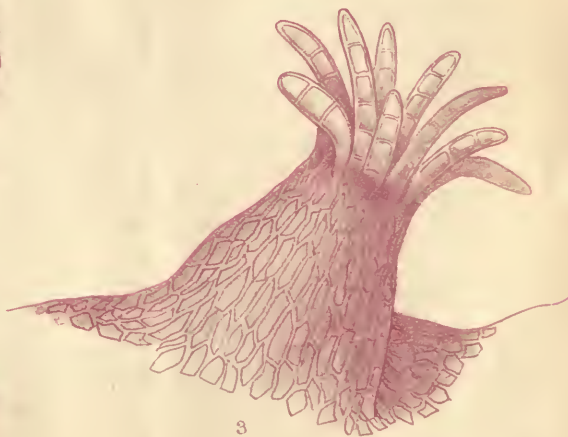
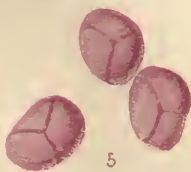
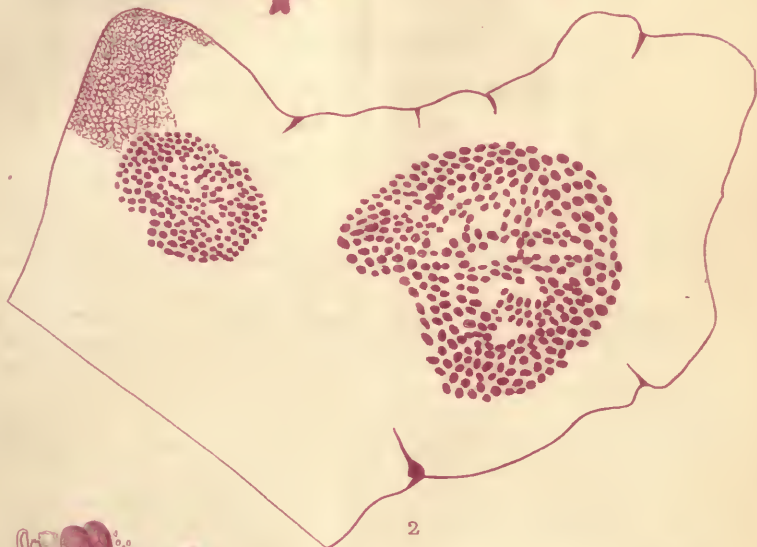
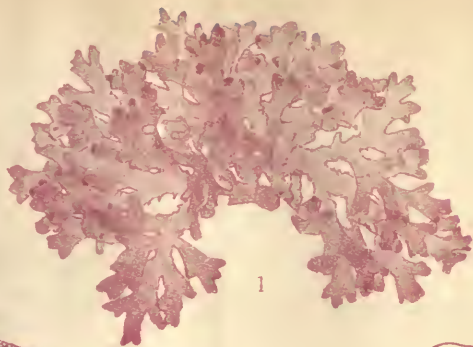
Nitophyllum thysanorhizans. *N. S.*—*General characters*: Frond, 1-2 inches long, of a thin membranaceous substance, very flaccid, and of a pale rose colour, glossy when dry, and adhering closely to paper. Frond much branched, branches between pinnate and furcate, from one to two lines broad, slightly dilated upwards; the terminal segments generally two-lobed, one lobe being shorter and smaller than the other. The fronds are everywhere fringed, at intervals of about one line, with minute cellular processes, which develop roots at their extremities, and by these the plant adheres to other Algæ.

Microscopical structure: Cells polygonal, becoming smaller and quadrate at the margin of the frond; the cellular processes are composed of large elongate polygonal cells, which become smaller and very dense toward the point from which the roots arise. A network of minute veins traverses the whole of the frond, and is especially noticeable in the ultimate segments, the veins being formed of a single row of narrow, somewhat cylindrical cells. Tetraspores distinctly tripartite, collected into definite rounded sori in the apices of the ultimate segments. Capsular fructification not yet met with.

Habitat: Thrown up on a mud-bank at Torpoint, and at Mount Edgecumbe, near Plymouth. Perennial?

This interesting little plant has probably been overlooked for many years as a variety of *Rhodymenia bifida*, under which name I have several times received it, and have also seen it among the Algæ collected by the late Dr. Cocks, and now in the possession of the Linnean Society. This mistake has most likely arisen from the similarity of its branching to that of *R. bifida*, and perhaps also from the rare occurrence of its tetraspores. From *R. bifida*, however, and from *R. cristata*, which it also resembles, it is abundantly distinguished by its *definite* sori, and *tripartite* tetraspores. From *Nitophyllum punctatum*, to the narrow forms of which there is a close resemblance in colour and general appearance, it is separated by the tetraspores forming sori in the *apices* of the frond *only*, and by its *fimbriate margin*.

N. thysanorhizans has not, so far as I have been able to ascertain, been found in any other locality than the one above mentioned. It is thrown up there in some abundance in July, but the tetraspores





are not commonly met with. It has also been found, with tetraspores, in the month of January, by my friend Mr. Goode, of Plymouth.

EXPLANATION OF PLATE XII.

- 1.—The entire frond.
- 2.—Apex of ultimate segment, showing the unequal terminal lobes with the definite sori $\times 20$.
- 3.—One of the marginal processes $\times 100$.
- 4.—Tetraspores *in situ*, showing also the veins and cells of frond $\times 100$.
- 5.—Tetraspores $\times 200$.

NOTICES OF NORTH AMERICAN FUNGI.

By THE REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 180.)

276. **Corticium diminuens.** *B. & C.*—Rav. Fasc. iii., 31. Album stratosum, hymenio cretaceo diminvente. No. 4009. Alabama, Peters.

Consisting of several layers, each separated by a dark line; hymenium white, diminishing in width each time of growth, so as to leave a narrow zoned border.

277. **Corticium subgiganteum.** *B.*—Effusum rigidum cremoricolor marginem versus subfuscum; hymenio e velutino glabro. Rav. No. 1669.

On *Magnolia glauca*. Sent as a form of *C. giganteum*, but the texture is different. Widely effused; at first cream coloured, rigid, then acquiring a brownish tint, especially towards the margin; velvety in the younger parts, smooth in the older.

278. **Corticium scariosum.** *B. & C.*—Tenue secernibile membranaceum immaginaturn; hymenio pulverulento ochroleuco. No. 4916. On alder. Car. Sup.

Forming a thin, oblong, membranaceous separable stratum, without any distinct border; hymenium pulverulent ochroleucous.

279. **Corticium aschistum.** *B.*—Tenue rigidum secernibile ochroleucum tuberculatum papillatumve; hymenio velutino. No. 1430. Car. Inf. On the under side of a trunk of *Acer rubrum*, lying on damp soil.

Effused, thin, separable, smooth beneath, rigid; hymenium papillate or tuberculate; velvety.

280. **Corticium portentosum.** *B. & C.*—Ochroleucum, contextu crasso albo molli spongioso; hymenio tuberculato glabro. No. 3620. Penns. Michener.

Forming a thick mass on very decayed wood, spreading widely; substance soft, white, spongy; hymenium tuberculate smooth. Some parts, however, are free from tubercles.

281. **Corticium colliculosum.** *B. & C.*—Tenue adnaturn; mycelio albo; hymenio late ochroleuco papillato granulatoque glabro. No. 5297. New Eng., Sprague.

Thin, adnate, inseparable from the matrix, springing from a white mycelium which penetrates the matrix, but is scarcely visible externally; hymenium papillate, and also minutely granulated, independently of the matrix. No. 6025. Penn., Michener (*Corticium compactum*, B. & C.), is possibly a state of the same species.

282 ***Corticium scutellare***. B. & C.—Resupinatum effusum immarginatum ex albido subalutaceum; hymenio in areolas minutas fisso. No. 2473, Car. Inf. 5626, New Eng., Sprague. 6091, Alabama, Peters.

On oak. Rav., No. 1584. On dead herbaceous stems.

Widely effused, thin, inseparable, immarginate; hymenium from dirty white to tan-coloured or tawny. It occurs also in Venezuela.

* ***Corticium quercinum***. P.

* ***Corticium cinereum***. Fr.—Under many numbers from various quarters. No. 1717, on *Vaccinia*, is an unusually thick form. *Corticium murinum*, B. C. No. 4023, on *Cornus Florida*, is perhaps also a form.

* ***Corticium incarnatum***. Fr.—Equally common with the last.

* ***Corticium polygonium***. Fr.—No. 4893, Massac., Sprague.

283. ***Corticium alutarium***. B. & C.—Effusum immarginatum alutaceum; hymenio papilloso. No. 5169, 5335, New Engl., Sprague. 6349, Penns., Michener.

Either on smooth or rugged bark or wood, following all the inequalities; bright, tan-coloured, papillate.

* ***Corticium Sambuci***. Fr.—No. 6208, New Engl., Murray. No. 4362, Penns., Michener. On *Rubus*. *Corticium Rubi*, B. & C., is scarcely different.

* ***Corticium comedens***. Fr.—No. 3608, Penns., Michener. On *Celastrum scandens*, Rav. No. 1544. On *Melia Azederack*.

* ***Corticium arachnoideum***. B.—No. 2523, Car. Inf., and several other numbers.

284. ***Corticium leucothrix***. B. & C.—Effusum olivaceo-rubrum; hymenio setis candidis vestito. No. 4775. On pine.

Effused immarginate, of a reddish olive, beset with delicate white bristles.

285. ***Corticium brunneolum***. B. & C.—Effusum, inseparabile; margine albo byssoideo; hymenio brunneolo. No. 3664, Louisiana, Dr. Hale.

Effused, resupinate, inseparable; margin white, narrow, byssoid; hymenium brownish.

* ***Hypochnus rubro-cinctus***. Ehrh.—Rav., Fasc., i., 33. Louisiana.

* ***Guepinia Spathularia***. Fr.—No. 246, Car. Sup. No. 3146, Texas, C. Wright.

286. **Guepinia petaliformis.** *B. & C.*—Pileo flabelliformi margine crispato tuberculoso, hymenio supra nudo, infra venoso. No. 6052, Alabama, Peters.

On dead wood about an inch high; stem compressed; pileus flabelliform, with the margin crisped and tuberculate; hymenium naked above, pubescent and venose below.

* **Guepinia elegans.** *B. & C.*—*Hook. Kew Misc.*, i., p. 239. Fulva; pileo suborbiculari margine incurvo; subtus pulverulento-velutino; stipite hispido; hymenio succineo-fusco lævi Rav. On dead trunks of juniper. No. 1024, Santee River.

Pileus $\frac{1}{2}$ -inch across; orbicular or slightly flabelliform between velvety and pulverulent and ferruginous below; hymenium even; brownish amber coloured; stem hispid, $\frac{1}{3}$ -inch high, $\frac{1}{2}$ a line thick. Very distinct from the allies of *G. Spathularia*.

287. **Cyphella fulva.** *B. & Rav.*—*Rav.*, Fasc., iv., 16. -Gregaria pezizæformis margine incurvato extus villosa fulva. No. 6296. On Alder. Maine, Rev. J. Blake. *Rav.*, No. 1683. On *Alnus serrulata*, Car. Inf.

Forming little erumpent tufts pezizæform, clothed externally with tawny down. *Cantharellus fasciculatus*, Schwein. Torrey, New York, is the same.

288. **Cyphella furcata.** *B. & C.*—Stipite cylindrico hic illic furcato, cupulisque cyathiformibus ferrugineis tomentosis. No. 4022. On alder. Alabama, Beaumont.

Like the last, growing in little groups, but consisting of fewer individuals; stem cylindrical, often forked, terminated by cyathiform cups, tomentose and ferruginous externally. A very curious species.

289. **Cyphella filicicola.** *B. & C.*—Stipite brevissimo; cupulis irregularibus minutis extus subtiliter tomentosis umbrinis. No. 4934 Car. Sup.

On dead fern. Stem very short, cups irregular, sometimes oblique, very obscurely tomentose umber.

290. **Cyphella subgelatinosa.** *B. & Rav.*—Sessilis applanata fusca; margine leviter inflexo. *Rav.*, No. 1714.

On *Alnus serrulata*. Looking like a brown subgelatinous Peziza; brown, flat, sessile, with a narrow inflexed border.

291. **Cyphella cupulæformis.** *B. & Rav.*—Sparsa cupulæformis minuta grisea extus subtiliter tomentosa; hymenio fusco. *Rav.*, No. 1403. Car. Inf. On trunks of *Juniperus virginiana*.

Scattered, externally grey, cup-shaped sub-globose, very obscurely tomentose; hymenium brown. Resembling at first sight *Peziza Godroniana*.

292. **Cyphella Ravenelii.** *B.*—Sparsa globosa ore parvo aperta extus tomentosa pallide cervina. *Rav.*, No. 1755. On bark of *Carya*.

Scattered globose opening with a minute orifice, pale fawn colour, tomentose, hairs minutely rough, spores elliptic, .00025 long.

293. **Cyphella fasciculata.** *B. & C.*—*Erumpens fasciculata congesta pallida irregularis subtiliter tomentosa.* No. 2659. New York, Sartwell. On willow.

Like *C. fulva*, forming little erumpent tufts, consisting of pallid obscurely tomentose irregular shallow cups.

294. **Hymenella rhabdophora.** *B. & Rav.*—*Resupinata gelatinosa fuscescens; conidiis filiformibus trinucleatis; sporis ellip-tisis.* Ravenel. No. 1441. On *Acer rubrum*.

Forming little gelatinous tubercles, varying from honey-coloured to brownish, consisting of flexuous threads with filiform, slightly curved, trinucleate conidia, .002 long, and elliptic spores.

295. **Hymenella hæmatococca.** *B. & C.*—*Tenuissima sanguinea e floccis apice clavatis.* No. 3064. *Car. Inf.* On *Zea*.

Consisting of extremely thin blood-coloured patches, which are composed of short erect threads, strongly clavate above.

296. **Hymenella Phytolacæ.** *B.*—*Maculis hysteriiformibus atropurpureis; sporis (v. conidiis) filiformibus curvatis.* No. 941. *Car. Sup.* On *Phytolacca*.

Consisting of little dark purple hysteriiform specks, which produce a multitude of filiform strongly curved spores or conidia.

* **Sparassis crispa.** *Fr.*—*Rav.* No. 1613.

* **Sparassis spathulata.** *Fr.*—No. 1000. Santee River.

297. **Sparassis tremelloides.** *B.*—*Stipite obsoleto; ramis erectis tortis sinuatis intertextis.* No. 1380. *Car. Inf.*

Stem quite obsolete; branches crisped, waved and twisted, confluent with each other, so as to present a tremelloid aspect. This does not agree with any of the four figures of Krombholz.

* **Clavaria Botrytis.** *P.*—*Rav. Fasc. ii., 41.* No. 669, 1621. *Car. Inf.* No. 5384. New Eng., Sprague.

* **Clavaria amethystina.** *Bull.*—*Rav.* No. 1712. *Car. Inf.*

* **Clavaria fastigiata.** *L.*—No. 5963.

* **Clavaria muscoides.** *L.*—No. 4261. Penns., Michener.

* **Clavaria tetragona.** *Schwein.*—No. 5796. New Eng., Sprague. No. 3107. New Eng., Oakey.

* **Clavaria cristata.** *Holmsk.*—*Rav. Fasc. ii., 42.* No. 1828, 1869. Rhode Island, Olney, Bennett. No. 5338. New Eng. Sprague.

* **Clavaria rugosa.** *Bull.*—*Rav.* No. 1285.

* **Clavaria fuliginea.** *P.*—No. 1265. *Car. Inf.*

* **Clavaria subtilis.** *P.*—No. 3000. *Car. Inf.*

* **Clavaria pyxidata.** *P.*—No. 1620. Santee River, Ohio.

* **Clavaria aurea.** *Schæff.*—No. 533, 535, 536. *Car. Sup.* *Rav.* No. 1510, 1500 Cæsar's Head. *Car. Inf.*

* **Clavaria formosa.** *P.*—No. 3206. *Car. Inf.* No. 5315. New Eng., Sprague.

298. **Clavaria secunda.** *B.*—Caudice crassiusculo cito diviso ; ramis curvatis secundis ; apicibus apiculatis. No. 534. *Car. Sup.* No. 991. Santee River.

Pale yellow ; stem moderately thick, soon divided, branches curved, all leaning one way, tips shortly divided, apiculate ; spores yellow. *C. spinulosa*, Schwein. Herb.

299. **Clavaria leucotephra.** *B. & C.*—Caudice communi crassiusculo, ramis strictis apicibus furcatis acutis brunneis basi albo-tomentosis. No. 6362. *Car.* Amongst fallen leaves.

About 2 inches high, with the thickish common base ; branches straight, forked and apiculate at the tips, tomentose below.

300. **Clavaria Petersii.** *B. & C.*—*Rav. Fasc.* v. 33. *E* communi basi ramosa ; ramis strictis subfastigiatis apice apiculato divisis rufis. No. 4576 bis. Alabama, Peters. On dead wood.

About 2 inches high, branched from the very base ; branches straight, somewhat fastigiate, rufous, tips apiculate. No. 4576. seems to be *Clavaria decolor*, B. & C. U. S. E. E., from Hong Kong.

* **Clavaria stricta.** *P.*—No. 5321, 5322. Maine.

* **Clavaria crispula.** *Fr.*—No. 5799. New Eng. Sprague. *Rav.* South Carolina.

STRUCTURE OF AGARICS, PARTICULARLY OF THE HYMENIUM.

By J. DE SEYNES.*

When first studying the *Hymenomyces* one easily perceives that there are no precise rules nor definite characters for their classification. The limitation of the species among Phanerogams has already been subjected to much controversy, but in this respect the Fungi are far surpassed by the more fortunate vegetables, the fruits and flowers of which can be submitted to rigorous analysis. Here the characters are founded upon organs of such a nature as to necessitate the employment of the microscope, and a simple cell corresponds with many more complicated organs among the superior vegetables. The form of this cell ought to have its importance, above all the study of the fruit in one of large size, although it may be reduced to a simple cell ; this cell offering differences of form, colour, &c., sufficient to furnish good characters. One ought not, therefore, to separate the anatomic study of the types from that of their external characters, which are visible to the naked eye. Whilst we are searching in this way for a fit union between the two, an important work is being published in Germany with

* Translated from the Introduction to " Flore Mycologique de la Montpelier."

the same end in view, and M. H. Hoffmann has given two parts, which appear to us to supply the actual wants of the science, which has until now been a veritable gap. By the representation of the specific type in its normal state, the study of its tissues, and of its development, all three being presented, reveals some facts which will facilitate the classification of the Agarics. The works of Corda, before those of Hoffmann, have opened the way, for they embrace all Fungi, and are produced more particularly from an anatomic and physiological point of view. They have in this respect rendered great service, and facilitate ulterior researches.

Three principal parts together compose the vegetation of an *Hymenomycete*—the mycelium, the receptacle, or hymenophore, and the hymenium.

I. *The mycelium and receptacle, or hymenophore.*—The mycelium, the elementary composition of which is very simple, found under the soil, or under the *débris* of dead leaves or branches, affects different appearances, generally white, sometimes yellow, and also red. It is at times filamentous or silky (*nematoid* mycelium of M. Lévillé*), at times like felt (*hymenoid* mycelium of the same author); finally, at times it becomes compact and solid, for a long time regarded as a perfect fungus, and was called *Sclerotium*; this is the *scleroid* or tuberculous mycelium of M. Lévillé. This author has also signalled the *malacoid*, or pulpous mycelium belonging to some *Physariacei*, or to some *Trichiacei*, the fungoid nature of which is actually contested.†

The nematoid mycelium, which is more frequently found amongst Agarics, varies extremely in appearance, at times presenting itself like some rayed threads of silk, and prickly, at times ramified or dichotomous, like some radicular fibres, and at times so thin that it is easily pulverized; it certainly has its characteristic value. Hoffmann, draws from its absence, or its concrete form, a conclusion which appears to us quite just. "That there is more difference," says this author, "than the kind of development in *Amanita* without a mycelium, which recalls the *Gasteromycetes*, and among which the mycelium is replaced by the veil, and some Agarics, with a permanent mycelium in the form of *Sclerotium*, as for example, *Agaricus tuberosus*."‡ One can, perhaps, place more value on the permanence or annual disappearance of the mycelium, than to the perennial, or to the annual or biennial life of the stem of Phanerogams, where the form of the organs of vegetation so notably differ, it follows that they are monocotyledons or dicotyledons, the mycelium may affect different modes of development, as in the two examples cited by Hoffmann.

The concrete mycelium or sclerotium is rather scattered amongst

* "Annales des Sci. Nat," 2nd ser., t. xx., p. 78, &c.

† The observations of Wigand (Pringsheim's Jahrbucher) appears to me to shake strongly the hypothesis of M. de Bary, as to the animal nature of these small productions.

‡ Hoffmann, Icon. Analyt. Fung., Heft. i, 1861.

the Agarics, as the remarkable researches of L  veill   have demonstrated it,* and removed all doubts on the subject. In his recent work ("Selecta Fungorum Carpologia," p. 107), M. Tulasne gives a rather instructive history of *Sclerotium*, which appears to be most complete on the subject.

M. L  veill   has indicated the mode of sclerotial formation, which has greater analogy with the rhizome, as is remarked in *Agaricus fusipes*; the base of the pedicel is permanent, and produces the following year some new Agarics, becoming more or less branched. The mycelioid nature of the *Sclerotium*, and its assimilation to the organs which, in the Phanerogams, take the place of veritable stems, is a proof more in favour of the theory, first noticed by Palissot de Beauvois, and then by Dutrochet, of the identity of the mycelium with a stem or thallus.

The hymenophore, which is only the condensed mycelium, participates in the vegetative function, but in a more especial manner, to elaborate the reproductive bodies. It is cellular, membranaceous or parenchymatous, formed of a pedicel and a cap, at times reduced to a cap, which spreads into a membrane, and is clothed with a hymenium, reposing upon a smooth surface (*Thelephora*); at other times the inferior surface is folded, forming plates, pores, spines, &c., upon which are the organs of fructification (*Polyporus*, *Hydnum*, &c.)

The collected cells which form the stipe, and which afterwards expand in the cap, are generally rather uniform, long, fibrous, often much separated, rarely ramified, presenting at times in their distance from each other, at others in their dimensions, differences which on the fissure of the stipe, present an aspect either fibrous, granulated, spongy, or woolly. The cellular fibres are always closer and more compact at the cortical part. The volva and ring, which give excellent characters for classification, ought always to be studied in their structure in each type. The cells of the parenchyma of the cap are more ramified than those of the stipe. One sees them form by anastomosing and crossing each other, some polygonous trellis-work. In the meshes so formed, there is a second system of larger cells. These two systems have been described by Corda, especially amongst *Russula*. "These two forms," says this author, "are not always neatly separated, but pass, as the organ requires, more or less rapidly one into the other, or, what is more rare, they are substituted one for the other. These two forms of tissue taking part, generally both together, in the structure of the hymenium, each giving birth, or both together, to one or many organs of the hymenium."†

Amongst the *Lactarii* some lacticiferous vessels may be seen, often of a larger calibre, running over the meshes of the parenchyma, and forming a new system of organs. Why give them the

* Ann. des. Sci. Nat., ser. ii., t. xx. (1843), p. 218-248.

† Corda, Icones Fungorum.

name of vessels? This does not appear to us exact, because if the cells which form them are very long, it is yet possible to find, from time to time, that some are divided transversely. We have seen them in *Lactarius deliciosus*, but they are to be perceived in other species; the *Lactarii* affording an opaque, resinous juice, which fills the cells, and it is not easy to discover the real nature of the cellular tube. In *Fistulina buglossoides*, which contains an abundant red juice, the juice is more fluid, is not so concreted, and is contained in the special varicose and sinuous tubes, like the laticifers, but perfectly furnished with transverse divisions. These cells have not always a distorted or varicose disposition, they are often rectilinear, like those figured by Hoffmann (Icon. Anal. Fung., i., tab. 2, f. 5) but on approaching the lamellæ the same series of cells is curved, and recurved, thus showing that here the milky secretion appears more abundant; one sees more numerous drops after the section. This only really exists, not when one has cut a greater number of laticiferous cells, but when one has cut the same one many times. It is, at least, this which we have seen very well in *Lactarius deliciosus*. As to the importance of the liquid, it is difficult to judge, because numerous Agarics are deprived of this proper juice, at least it can only be admitted that, if existing at all, it is not equally visible, because of its containing resinous or fatty bodies, which may be seen. One finds this same milky juice in the organs of the hymenium, for if the lamellæ are cut when a *Lactarius* begins to ripen, one sees in the basidia, the cystidia, and the sterile cells of the hymenium, the concrete matter of the laticiferous cells.

The exterior surface of the cap, or of the stipe, is sometimes furnished with productions which contribute to give them a particular appearance, at times these are rather large hairs, simple or branched, in which are accumulated granulations which are only slightly disseminated in the exterior cells of the parenchyma (*Agaricus phaioccephalus*, Bull., *Agaricus setiger*, Fr., *Agaricus terreus*, Schæff., and a great number of others). At other times these hairs are not visible to the eye, and give simply a dull aspect to the surface on which they occur. In fine, one finds at times some cells which belong to this kind of production, but which, in lieu of preserving the elongated cylindrical form of the parenchymatous cells, dilate and become spherical, like the primitive vegetable cell. The surface always takes a more or less characteristic pulverulent or pruinose aspect. *Agaricus chrysophæus*, Schæff., offers a very good example; its cells are large, and filled with grey-brown granulations of the same nature as those which colour the exterior cells of the cap. In *Agaricus micaceus*, Bull., these same cells take still more considerable dimensions; they are filled with a clear liquid, and send out luminous rays, so as to take the appearance of sheets of mica, from which the name of the Agaric is taken. These cells have greater analogy, as for their structure and

contents, with the cystidia, which are also bright, and found on the hymenium, and at the margin of the gills. The degree of abundance of these cells vary according to conditions which have not been studied as amongst the phanerogams. One sees, in effect, what enormous differences of aspect the same species, here smooth, and there extremely velvety, can present. It is the same with fungi, of which the hairs, scales, viscid, and soft state seldom vary much. One may easily guard against confounding the scales arising from the *débris* of the volva with the productions of which we have just spoken. There are also some scales which have the same specific importance; they are formed either upon the stipe or upon the pileus, by a stoppage of the development of the external stratum of cells, which, not following that of the internal parenchyma, break and leave at the surface of these organs more or less irregular fragments, thus causing the external suberous layers of the bark to present a cracked appearance. *Agaricus obturatus*, Fr., often presents itself under this aspect in our region. Krombholz has also given a figure under the name of *Agaricus obturatus rimosus*. The dessication caused to the periphery by external agents has great influence upon this phenomenon. I have often discovered, in a dry time, some *Agaricus melleus*, Wahl., the stipe of which presented some circular rings; their origin can only be attributed to the dessication of the external cellular layer, during which the stipe increases in height. There are some Agarics with which the elongation of the stipe is such that it is scarcely possible that external agents act in this sense, and one cannot call it a sort of deformity in them.

The agglomeration of the coloured granules to which the fungus owes its colour, either in the cells disposed in *phaneres*, or simply epidermic cells, is also subject to many variations. I cannot say whether the want of colour, the albinism has been noticed in many fungi, but I have in several cases encountered it upon some well characterised and easily recognised species; among others *Agaricus semiglobatus*, Batsch.; *Agaricus coronillus*, Bull.; *Agaricus micans*, Bull. By the side of this fact there is another quite opposite, it is the greater intensity of colouration, according with the bases of temperature; I have had occasion to verify it so frequently that I can no longer doubt it. *Agaricus nudus*, Bull, is found during winter in the parks in the neighbourhood of Montpellier; according as the temperature falls, it takes a dark violet, almost black, or a deep brown. When the spring arrives one finds some almost white individuals, shaded with lilac, or fawn colour, as we have proved upon an exposed hillock at midday. *Agaricus terreus*, Schæff., and *Agaricus dryophilus*, Bull, which accompany *Agaricus nudus* and pass the cold season with it, present with it the same phenomena.

I found, during December last, at a very cold time, in a farm yard of the Chateau Levat, a well characterised *Agaricus medius*, Schum., and the microscopic analysis has confirmed its identity,

the pileus was of an almost black sepia colour. Ordinarily this Agaric is white, at other times a little dirty. A figure by Delile shows a like phenomenon of colouration produced in this same species, but with less intensity, upon an individual found also during the month of December. As I am assured, by microscopic study, there is no new production of cellular elements, but simply a greater agglomeration of pigmentary granules. Finally, during a herborization, made in the beech woods of the Lozère, at a temperature of 5 to 6 degrees, I have been struck with the deep colouration of *Agaricus melleus* and *Agaricus lateritius*, Schæff., which were to be seen by hundreds, and the aspect of which differed very much from the same species found in the woods of inferior zones, during the fine days of autumn.

The result of numerous observations makes me certain that although the cold has an influence upon the intensity of the colouration among the Agarics, it does not follow that, in certain given conditions, an observer cannot, in the middle of winter, find an example of a normal colour, perhaps even more clear; it may be caused by its being shaded or placed in the neighbourhood of a source of heat, causing the body to develop in fermentation, the dunghill for example; an individual so found is placed in such conditions with few exceptions. If one cannot find a sufficient reason in the external circumstances, it follows then to recall the contingency of physiological phenomena, the limits of variation of which escape us, because of not knowing the exact causes. The phenomena due to the atmospheric influences ought to be submitted to some very numerous observations, and not to draw conclusions from isolated facts.

As to the influence of light upon the colouration of vegetables, one may believe that it is much more upon the green matter which it acts than upon the substances which colour the petals or other organs. A herborization in the oil mines of Rochebelle, near Alais, has enabled me to prove the little influence of the deprivation of light upon the colouring matters of Fungi. I have found at 80 metres depth, in the most complete obscurity, almost a kilometre from the entrance shaft, an Agaric allied to *Agaricus conopilus*, Fr., presenting upon the pileus the fawn-colour habitual to this Agaric. Some *Polyporei* reduced to a crustaceous expansion, with some vestiges of pores, have offered to me, in the same conditions, a sulphury tint. Moreover, the figures given by authors who are specially occupied with the fungi of mines, demonstrate this fact. F. Hoffmann has represented in his "Vegetabilia in Hercyniæ subterraneis collecta," an Agaric which appears rather like *Agaricus gole-riculatus*, Scop., this species, called by him *Agaricus myurus* (pl.iii.), is much coloured, also *Agaricus undulatus*, given in pl. iv. of the same work. The want of light which acts so little upon the colouration, has it more effect upon the general vegetation? "That which is most evident," says E. P. Fries, "up to what point the

development of the *Hymenomyces* is subject to the action of light, it is that those which have not been exposed to its influence ; those, for example, which have grown in the galleries of mines, in caves, or in hollow trees, take the most curious abnormal forms, their metamorphosis remaining incomplete, or otherwise the whole fungus, preserving its mycelioid nature, its growth is cut short in a monstrous modification of the mycelium." In admitting this fact generally, it does not, it appears to me, follow the idea which one has of the superior vegetables. I believe that an equal temperature, certain conditions of constant warmth and humidity, ought to have here as much effect as the want of light, and to cause rather a sort of exuberance which is opposed to the formation of the fructifying organs, thus a too luxuriant vegetation often puts an obstacle in the way of the flowering or fructification of the Phanerogams.

NOTE ON LECANORA RALFSII (SALWEY), CROMB.

By the REV. J. M. CROMBIE, F.L.S. & G.S.

In the Rev. Mr. Salwey's "Observations on Penzance Lichens," in the Annals of the Penzance Natural History Society, ii. (1853), p. 144, there occurs the following notice of a supposed new species of *Lecidea* :—

No. 34. *Lecidea*, *nova species*, gathered with Mr. Ralfs at Lamorna.

"This is hitherto a unique specimen, though I hope Mr. Ralfs will be able to find more of it. It consists of a thin, closely pressed, crustaceous thallus, of a dusky-green colour, with irregular warty protuberances and flattened scales intermixed. The apothecia, which are extremely minute, have scarcely any border, and are of a dull reddish-brown. Some of them are of a dull fawn-colour ; but this appears to be an older state, in which the disc has been worn away, leaving the pale colour of the apothecium visible."

Should it prove to be, as I believe it, undescribed, I would venture to call it *Lecidea Ralfsii*, from its discoverer.

The plant so named provisionally, does not appear, at least under the proposed name in any subsequent list of British Lichens. Its identification is, therefore, a matter not simply of curiosity, but of importance. Did Salwey rightly conjecture that it was a new species, or is the name proposed merely another synonyme of one previously described ? From authentic information recently obtained from Mr. Wm. Curnow, of Penzance, I believe that I am now in a position fully to identify this plant, and, as will be seen from what follows, it has a rather singular and interesting history. Several months ago I received from the above gentleman two specimens of *Lecidea Muddii*, Salw., to my great delight, as no British lichenist, save Messrs. Mudd and Salwey, would seem ever to have seen this lichen, nor does it appear amongst the large collection of British lichens from the latter gentleman in the herba-

rium of the British Museum. On first examination, the specimens thus received seemed to agree sufficiently well in all respects with that plant as described in Mudd Man., p. 178, *sub Biatorina*, and I took it for granted that they undoubtedly belonged to the desiderated *Lecidea Muddii*, Salw. (Mudd Man. l. c.), Cromb. Enum., p. 74, Leight. Lich. Fl., p. 315. The receipt, however, of several other specimens, with the apothecia in various stages of development, led me to hesitate somewhat as to the identity. This arose from the circumstance that one or two of the younger apothecia had a distinct though evanescent *thalline* margin. A more accurate microscopical examination revealed also that the hypothecium was *moderate* rather than *thin*, and *nearly colourless* rather than *pale-brown*, as Mr. Mudd describes it—a discrepancy, however, which can easily be otherwise accounted for, as the apothecia in the specimen examined by Mr. Mudd were most probably old ones.

On sending a specimen to Dr. Nylander for his opinion, he wrote in reply that the plant was a true *Lecanora* and that if not the veritable *Lecidea Muddii*, it was certainly a new species. This led to farther correspondence with Mr. Curnow, the result of which was the conclusion that *Lecidea Ralfsii* and *Lecidea Muddii* were one and the same plant. The evidence for their specific identity appears to be, in all respects, perfectly satisfactory, and is to the following effect. Amongst some forty specimens of the lichens described by Mr. Salwey in the above paper, one of his *Lecidea Ralfsii* was deposited in the Penzance Museum. This was borrowed by Mr. Mudd at the time when he was preparing his manual, and by some oversight or other, was not afterwards returned. The identity, however, even in the absence of the original specimen, can otherwise be sufficiently established. That the original specimen of *L. Ralfsii* was identical with the specimens received by me from Mr. Curnow, *s. n. L. Muddii*, is proved by others subsequently gathered by Mr. Ralfs in company with Mr. Curnow, in the same spot, where the type, the appearance of which was quite familiar to Mr. Ralfs, was obtained. And that Mr. Curnow's specimens were identical with *L. Muddii* of Mr. Mudd's manual is proved by their equally corresponding with the description there given of this species, except in the two minor characters above mentioned, and also in the thalline margin of the apothecia, which evidently was wanting in the single specimen seen by Mr. Mudd. It is, therefore, I think, quite clear that *Lecidea Muddii*, Salwey, in litt. 1860, = *Lecidea Ralfsii*, Salwey, in Ann. Nat. Hist. Soc., Penzance, 1853, and that as the latter was the first published name, the plant, for the reasons assigned, must henceforth be known as **Lecanora Ralfsii** (Salw.), Cromb. Why Mr. Salwey should have subsequently changed the name, and why *L. Ralfsii* should not be alluded to in Mudd Man., is a matter with which we have nothing to do, for our present purpose, though no doubt an easy explanation could be given by either of these gentlemen.

GEASTERS.—In a series of papers on Geasters which recently appeared in the "Gardener's Chronicle," Mr. Worthington G. Smith has figured all the British representatives of this genus. The species which is recorded in *Grevillea*, vol. i., p. 40, is considered distinct from both *G. lageniformis* (Vitt.) and *G. tunicatus* (Vitt.), and for it is proposed the name *G. Michelianus* (W. G. S.), it being regarded as identical with the plant *Micheli* has figured in his *Nova Plantarum Genera* t. 100, f. 1, under the name *Geaster major umbilico-fimbriato*, and with the specimens published in "Erbario Crittogamico Italiano" (No. 343 and 979) as *Geaster tunicatus Michelianus*.

In the same communication there is a figure of what is regarded as *Geaster lageniformis*, Vitt. This is a much smaller and more delicate plant, differing from the majority of Geasters in possessing perfectly round and smooth spores. It is comparatively a recent addition to our flora, having been up to the present time only recorded from Devonshire, and, possibly, Norfolk.

BRITISH LICHENS.—In the "Journal of Botany" for May, Mr. Crombie records 47 additions to the British Lichen-Flora, since the publication of Mr. Leighton's work. These are as follows:—*Collema stygium*, Del., *C. polycarpon*, Schær., *C. Laureri*, Fr., *C. auriculatum* var. *pinguescens*, Nyl., *Obryzum dolichoteron*, Nyl., *Leptogium amphineum*, Ach., *Calicium byssaceum*, Frs., *Alectoria divergens*, Ach., *Ramalina intermedia*, Del. *Parmelia prolixa** *Delisei*, Dub., *Pannaria nigra** *psotina*, Ach., *Lecanora diphyodes*, Nyl., *L. lutescens*, D.C., *L. piniperda*, Krb., *L. symmetrictera*, Nyl., *L. sarcopis** *homopis*, *L. subintricata*, Nyl., *L. varia** *leptacina*, *L. præpostera*, Nyl., *L. coniopta*, Nyl., *L. leucophæa*, var. *conglobata*, Flot., *L. alpina*, Smmrf., *L. peliscypha*, Whlbn., *L. glaucocarpa*, var. *depauperata*, Kphlb., *Lecidea misella*, Nyl., *L. metamorphea*, Nyl., *L. turgidula*, var. *pityophila*, Smmrf., *L. leucophæopsis*, Nyl., *L. squalida*, Ach., *L. asema*, Nyl., *L. alpestris*, Smmrf., *L. confusula*, Nyl., *L. mesotropoides*, Nyl., *L. mesotropiza*, Nyl., *L. deparcula*, Nyl., *L. subfurva*, Nyl., *L. atrobadia*, Nyl., *L. ænea*, Duf., *L. lavata*, Ach., and *f. ferrata*, Nyl., *L. occulta*, Flot., *Xylographa parallela*, var. *pallens*, Nyl., and *f. elliptica*, Nyl., *Opegrapha hapaleoides*, Nyl., *Arthonia proximella*, Nyl., *A. aspersella*, Leight., *Verrucaria analeptella*, Nyl., *V. submicans*, Nyl., *V. spilobola*, Nyl. For localities, &c., we refer our readers to the paper in "Journal of Botany," and for descriptions of the new species amongst them to former papers in "Grevillea."

Dr. L. Rabenhorst, of Dresden, has for disposal some sets of Chinese Lichens, collected in the neighbourhood of Saigon, Hong Kong, Wampoa, and Shanghai, by Rudolph Rabenhorst, in 1871-2, and determined by Dr. Krempelhuber, of Munich. The price of each set will be 5 thalers.

BOTANICAL PRIZES.—We are pleased to learn that the Botanical Society of Edinburgh offers a prize of Ten Guineas for the best essay on the Reproduction of Lycopodiaceæ, to be competed for by Students who have attended the Botanical Class at the Royal Botanic Garden, Edinburgh, during at least one of the three years preceding the award, and has gained honours in the class examinations.

A prize of Ten Guineas is also offered through the Council of the Botanical Society, by Charles Jenner, Esq., for the best essay on the Structure and Reproduction of the Frondose and Foliaceous Jungermanniaceæ. This prize is subject to all the conditions of the preceding.

CRYPTOGAMIC LITERATURE.

ANNALES DES SCIENCES NATURELLES. Vol. xvi., Nov., 1872, contains, S. Sirodot, Researches in the Freshwater Algæ of the Family *Lemaneaceæ*, (pl. i., viii). E. Janczewski, on the Parasitism of *Nostoc lichenoides* (with a plate). M. Woronine, Researches on the Gonidia of *Parmelia pulverulenta* (with a plate).

BULLETIN DE LA SOCIÉTÉ BOTANIQUE. Vol. xix., parts I. & II., contain—A. Chatin, On the Truffle and its naturalisation; E. Roze, on the Fertilization of the Higher Cryptogams, especially *Sphagnum*; J. de Seynes, Physiological Experiments on *Penicillium glaucum*; H. Bonnet, on a New Truffle (*Tuber piperatum*); V. Payot, on *Woodsia ilvensis*; E. Boudier, on a remarkable anomaly in *Agaricus maculatus*; M. Cornu, on the Zygospores of *Mucor fusiger*; A. Chatin, on the culture of Morels.

MITTEN, W. New Species of Ceylon Musci, in the "Journal of the Linnean Society," March, 1873.

LEIGHTON, W. A. New Species of *Mycoporium*. "Journal of Linnean Society," March, 1873.

F. CURREY. On a New Genus of the order Mucedines (with a plate.) "Journal of Linnean Society," March, 1873.

THUEMEN (F. DE.). *Fungi Austriaci Exsiccati* Cent. vii. and viii., 4to, Teplitz.

MAGNUS, P. *Mycologische Bermerkungen*, in *Hedwigia*. April, 1873.

GEHEEB, A. *Bryologische Notizen*, *Hedwigia*. April, 1873.

NISSL, G. *Beiträge zur Kenntniss der Pilze*. 5 pl. 8vo. Berlin.

BERKELEY AND BROOME. *Notices of British Fungi*, in the "Annals of Natural History." May, 1873.

FLOWRIGHT, C. B. *Sphæriacei Britannici (exsiccati)*. Cent. I. King's Lynn. May, 1873.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By THE REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 7.)

- * **Clavaria fusiformis.** *Sow.*—In woods, Rav. No. 1080.
Pale yellow, not so brittle as *C. inæqualis*, and more fasciculate.
- * **Clavaria miniata.** *B.*—Hook. Lond. Journ., 1843, p. 416.
On damp, sandy ground. Car. Inf. No. 992.
- * **Clavaria inæqualis.** *Fr.*—Car. Inf. Rav. No. 1632. New England, Sprague. No. 5795.
- * **Clavaria argillacea.** *Fr.*—Penns., Michener. No. 3938. New England, Sprague. No. 5797.
- * **Clavaria fragilis.** *P.*—Car. Inf. No. 1313.
- * **Clavaria contorta.** *Holmsk.*—On dead branches. Car. Inf., No. 3831, New England, Sprague. No. 5398.
Maine, on birch, a darker form than usual. Rev. J. Blake. No. 6292.
- 301. **Clavaria filipes.** *B. & Rav.*—Pallide rufa; stipite filiformi distincto fistuloso, clavula longo cylindrica curvata. On the ground. Car. Inf. Rav. No. 1488.
Springing from a white mycelium; pale rufous; stem about an inch high, slender, club the same length.
- * **Clavaria mucida.** *P.*—Car. Inf. No. 655, 974, Rav.
- 302. *Var. Curtisii.* *B.*—Clavata brevis lutea apice fusca; stipite albo, e mycelio parco albo orbiculari oriundo. No. 974 is once forked and narrow.
On wet-rotting stumps.
- * **Clavaria acuta.** *Sow.*—On the ground. Car. Inf. No. 2947, 3244.
- * **Clavaria falcata.** *P.*—Alabama, Peters. No. 3877.
- 303. **Pterula densissima.** *B. & C.*—Pulvinata congesta e communi basi ramosissima; ramis tenuibus apice penicellatis. On the ground, under shrubs. New England, Sprague. No. 5324.
Forming dense rufous pulvinate masses; very much branched from a common base; branches slender, apices pencilled.

* **Calocera palmata.** *Fr.*—On dead branches. Boston, Murray. No. 6391.

* **Calocera albipes.** *Mont.*—(sub *Clavaria.*) Ohio, Lea. No. 56.

* **Calocera cornea.** *Fr.*—On dead wood. Car. Inf. No. 635, 1275, 2065. Ohio, Lea. No. 278. Penns., Michener. No. 3935.

* **Typhula Grevillei.** *Fr.*—On petioles of Liquidambar. Car. Inf. No. 2743.

304. **Typhula rubicola.** *B. & C.*—Filiformis opaca cylindrica apice clavata alba, insititia. On dead Rubus. Penns., Michener. No. 4332.

Thread-shaped, opaque, cylindrical, springing at once from the matrix; clavate at the apex. About $\frac{1}{3}$ of an inch high.

* **Typhula muscicola.** *Fr.*—Car. Inf. Rav. No. 1604. Penns., Michener. No. 3976.

A variety with the tips acute, and sparingly branched.

305. **Typhula mucosa.** *B. & C.*—Simplex filiformis acutissima, basi leviter incrassata. On dead herbaceous stems. Car. Inf. No. 3832.

Not above the $\frac{1}{2}$ of an inch high; slender, threadlike, springing from a minute bulb-like base, very acute. A much smaller species than *T. subulæformis*.

* **Typhula gyrans.** *Fr.*—On dead petioles. Car. Inf. No. 3844.

306. **Typhula tenuissima.**—*Curt. in Sill. Journ.*, 1848, p. 350. *Linn. Soc. Journ.*, x., p. 339. On dead leaves. Car. Inf. No. 1368.

307. **Pistillaria elegans.** *B. & C.*—Stipite e sclerotia orbiculari oriundo, clavula nutante aurantia. On slender dead twigs of *Viburnum opulus*. Car. Inf. No. 2780.

Stem short, cylindrical, springing from a flat, dark-brown sclerotium; head very obtuse orange. About $\frac{1}{4}$ inch high.

* **Pistillaria rosella.** *Fr.*—On dead leaves. Car. Inf. No. 1361.

308. **Exidia obliqua.** *B. & C.*—Nigra obliqua expansa subtus velutina hymenio lævi. On branches. New Engl., Murray. No. 5692.

Black, expanded, oblique, attached on one side, velvety beneath, as in *E. glandulosa*, hymenium without spicules.

* **Exidia glandulosa.** *Fr.*—Car. Inf. No. 694. Rav. No. 1380. Maine, Sprague. No. 6212. Car. Sup. No. 121, 333.

* **Exidia truncata.** *Fr.*—On dead branches. No. 3533. Penns., Michener.

* **Exidia recisa.** *Fr.*—On oak. Car. Inf. No. 2786.

309. **Exidia picea.** *B. & C.*—Erumpens; pedunculo cylindrico brevi, hymenio cupulæformi subtus lævi. On *Betula lenta*. Car. Sup., No. 4493.

About $\frac{1}{8}$ inch across, pitch black; stem short, cylindrical; hymenium cup-shaped, smooth externally.

310. **Exidia pedunculata.** *B. & C.*—Stipite distincto sulcato, hymenio expanso lobato demum deflexo. On pine. Car. Inf., No. 3750.

About $\frac{1}{8}$ of an inch high, horn-colour; stem erect, sulcate, bearing at the apex the expanded, lobed, and at length deflexed hymenium, about $\frac{1}{12}$ of an inch across. At first tuberculiform, and attached to a white floccose mycelium, which at length entirely vanishes.

* **Hirniola Auricula-Judæ.** *Fr.*—Car. Sup. No. 308, 404, 5055. Ohio, Lea. Texas, C. Wright. No. 3143.

311. **Hirniola scutelliformis.** *B. & C.*—Minuta orbicularis, subtus candida; hymenio fusco. On branches of *Asimina*. Alabama, Peters. No. 6343.

About $\frac{1}{12}$ inch across, looking like a flat Peziza; thin, orbicular, white beneath, hymenium brown. Sometimes laterally confluent, and forming a continuous mass.

* **Tremella lutescens.** *Fr.*—Car. Inf. No. 1552. Car. Sup. No. 528. Ohio, Lea. Alabama, Peters. No. 4573.

* **Tremella foliacea.** *P.*—New England, Murray. No. 5312. Car. Inf. No. 2532, 1531.

* **Tremella albida.** *Huds.*—Car. Inf. No. 2392, 2749. No. 2967. Ravenel. No. 1076. New England, Sprague. No. 5402.

312. **Tremella gigantea.** *B. & C.*—Maxima, pallide ferruginea, foliacea, firma. Alabama, Peters. No. 3806.

Very near *T. ferruginea*, but paler and firmer.

* **Tremella sarcoides.** *Sm.*—On Birch. Car. Sup. Curt., No. 4459. New Eng., Sprague, No. 5686.

* **T. intumescens.** *Smith.*—Car. Sup. No. 768, 794, 881. Car. Inf. No. 1403, 1679. Penns., Michener, No. 3970.

* **T. mesenterica.** *Retz.*—Car. Sup. No. 14. Car. Inf. No. 1407.

313. **Tremella dependens.** *B. & C.*—Sacciformis subclavata, viridi-flava dependens. On *Liriodendron*. Alabama, Peters. No. 6455.

Sacklike, elongated, subclavate, subtranslucent, thin, watery, mucilaginous, dissolving when the thin outer skin is broken; pale, watery, greenish-yellow, $\frac{1}{8}$ -1 inch long. Hanging down from the under side of rotting tulip logs after rains. July, Sep. Allied to *T. vesicaria*.

* **Tremella aurantia.** *Sch.*—Car. Sup. No. 430, 1520.

* **Tremella vesicaria.** *Bull.*—Penns., Michener. No. 3981, 3984. New Eng., Murray. No. 5658. *Leotia anomala*, Schwein. MS=*Guepinia Helvelloides*, Schw.

314. **Tremella marmorata.** *B. & C.*—Magna cerebriformis compacta granulata nigra intus marmorata. On oak logs. Car. Inf. No. 3023. Aug.

Forming a thick, compact, brainlike mass, of a dark-brown tint inclining to black, with the habit of *Næmatelia encephala*, marbled within like a truffle; threads waved; spores oblong. No. 5687. New England, Sprague. Appears rather to be a state of some *Hypoxylon*.

* **Tremella tortuosa.** Willd.—Car. Inf. No. 1273, 1279, 1499, 2972. Car. Sup. No. 761. New Eng., Murray. No. 5710.

315. **Tremella enata.** B. & C.—Erumpens, convexa, tuberculiformis rufa; floccis dichotomis erectis. On *Alnus serrulata*, No. 2191. Car. Inf. On oak. No. 2456.

Erumpent, forming little rufous tubercles; flocci erect, dichotomous.

* **Næmatelia encephala.** Fr.—On oak. Alabama, Peters. No. 6096. No. 4892, from Maine, is apparently a young state.

* **Næmatelia nucleata.** Fr.—Car. Inf. On oak and Nyssa. No. 2642. *Tremella gemmata*, Lèveillé. Ravenel, No. 1441, on *Acer rubrum*—is apparently a confluent state of the same species.

316. **Dacrymyces chrysosperma.** B. & C.—Erecta clavato-lobata aurantiaca; sporis aureis 4-6 septatis. New England, Sprague. No. 6211.

On stumps; erect, lobed above, orange, dusted with the golden spores. More highly developed than *D. deliquescens*.

* **Dacrymyces deliquescens.** Fr.—New England, Sprague. Russell, No. 5951. Car. Inf. No. 3036. Ravenel, No. 1378, 1177.

* **Dacrymyces stillatus.** Fr.—Car. Inf. No. 1080, 1877. No. 5894.

317. **Dacrymyces syringicola.** B. & C.—Erumpens plana epidermide cincta pallida; conidiis oblongis curvulis quandoque furcatis. On *Syringa*. Car. Inf.

Forming little concave pallid spots, resembling some *Stictis*, surrounded by the cuticle; conidia oblong, curved, sometimes forked at one end. Allied clearly to *D. cinnabarina*, Schwein, which has a similar habit; on willow and mulberry.

318. **Dacrymyces destructor.** B. & Rav.—Erumpens, epidermide cincta, tuberculata pallida; conidiis oblongis curvulis quandoque furcatis. On branches of pear, to which it is very destructive. Car. Inf., Ravenel. No. 1233.

With the habit of the last, but tuberculated.

* **Ditiola radicata.** Fr.—On pine wood. No. 3250. *Ditiola gambosa*, B. & C.

319. **Coryne gyrocephala.** B. & C.—Stipite cylindrico rufo demum sulcato, capite fusco gyroso. On rotting logs in swamps. Car. Inf. No. 1191.

About $\frac{1}{4}$ inch high, stem cylindrical, rufous, at length slightly sulcate; head brown, gyrose, as in *Helvella esculenta*. A very remarkable fungus.

DAS MOOSBILD OF DR. ERNST HAMPE.

By ROBERT BRAITHWAITE, M.D., F.L.S., ETC.

II.

In reviewing Dr. Hampe's arrangement of mosses given in Vol. i., p. 10, we have first to consider the value of the two sections under which the families are grouped; and these, it will be seen depend on a single character—the condition of the calyptra. The large saccate hood in the three families included in *Sacomitria* is torn irregularly by extension of the fruit (and, indeed, it is the degree of expansion in the capsule which determines the form of the calyptra in all mosses), but we may question whether this circumstance is deserving of the importance attributed to it, since in all other points they have nothing in common, and we incline to follow the view of preceding authors that *Sphagnum* in its leaf-structure, arrangement of branches, and internal anatomy of stem, differs so far from all other mosses as to be entitled to represent a subclass. *Andreaea*, notwithstanding its affinity in leaf-structure to *Grimmiaceæ*, cannot be allied with them, as some authors have done, but may conveniently remain as the section *Schistocarpi*. *Archidium* agrees too closely with *Pleuridium* in most of its characters to permit of its being separated far from that genus, and both of them appear to have their most natural position as the lowest members of a series comprising *Seligeria*, *Ditrichum* and its allies, *Dicranella*, &c., with *Dicranum* as its highest form.

In the second section we have a return to some of the old subdivisions characterised by the position of the fruit, and the Cleistocarpous group is maintained, although the learned author was one of the first who broke up the Phascoid mosses, and distributed them among families containing more highly developed species; as he also was to indicate the importance of the areolation in all mosses, by which in recent years we have acquired such additional facilities in the discrimination of species.

Pottiaceæ and *Blindiaceæ* are adopted instead of *Trichostomaceæ* and *Dicranaceæ*, because, says the author, it would be barbarous to apply such terms to families which include mosses having no peristome. We do not see the force of this reasoning, but would regard a moss to be *Dicranaceous* which agreed with the genus *Dicranum* in its most important characters, and not necessarily that it should have the bicrural teeth of *Dicranum*; besides, the great genus *Dicranum*, being the best developed in the group, must stand as the type; and the same applies to genera, for we should have to separate species without a peristome, if the generic name imply that one be present, *e. g.*, *Zygodon viridissimus*.

In placing Polytrichaceæ and Buxbaumiaceæ under Mniaceæ, the author reverses the principle previously acted upon; the free lamina of the leaf in *Polytrichum* has indeed cells like those of *Mnium*, but we do not find any resemblance in the structure of the peristome. The tall dendroid habit of *Polytrichum* and the solid structure of the stems entitle the family to a high place in the muscine group; and, as the author points out, *Pogonatum* cannot be maintained as a genus apart from *Polytrichum*, for the angular outline of the capsule in some species of the latter genus is scarcely distinguishable.

In the Cladocarpi the fruit is borne at the end of lateral branches, without any specially formed perichætal leaves, and in Fontinalaceæ is included *Cinclidotus*. In Cryphæaceæ is placed the genus *Hedwigia*, and notwithstanding that Mr. Mitten refers it to Neckeraaceæ, we must own that we have a leaning to the view that it is Grimmiaceous; but we must remember that both authors have based their opinions on the study of many exotic forms of the group, and they are therefore entitled to the highest respect.

The Pleurocarpi are characterised by lateral fruit, arising from a distinctly lateral bud. The arrangement of the host of species belonging to this section has hitherto proved a difficult task to almost every systematist, owing to the immense number of transitional forms; some, *e. g.* Prof. Schimper, have attempted to evade it by forming a great number of genera, very good on paper, but not so satisfactory in practise; others, like C. Müller, mass the whole together and break the genus up into sections; perhaps a middle course between the two will prove most advantageous. Dr. Hampe apparently regards the whole as representing one great family, divisible into tribes and grouped in three sections.

1. Brachycarpi, having symmetric capsules, immersed or on a short seta. The Neckeraaceæ are the chief representatives of this section.

2. Orthocarpi, with symmetric capsules elevated on long setæ. *Leskea* will stand as the type of this group, and to this genus the author refers *Pylaia* and *Homalothécium* as *Sciuro-Leskea*, *Amblystegium subtile* and *Sprucei* as *Serpo-Leskea* and other species to *Drepano-Leskea*, *Cyrto-Leskea* and *Dendro-Leskea*.

3. Camptocarpi, fruit curved, elevated on a long seta. These present the highest degree of development in the Hypnoid mosses, for it appears to be the rule that in a curved or pendulous capsule we find the greatest perfection of peristome. Dr. Hampe regards *Hookeria* and *Hypnum* as two genera embracing all the species, much as C. Müller does in his Synopsis; but we have again in *Hypnum* the singular play with the generic name seen in *Leskea*. *Hookeria* is divided into seven groups—*Euhookeria*, *Mniadelphus*, *Chætophora*, *Pterygophyllum*, *Hypnella*, *Holoblepharum*, and *Callicostella*.

Many excellent remarks are given on the Hypnaceæ, and the arrangement of the genus is as follows:—

A. Platy-hypnum—

- | | |
|------------------|----------------------------------|
| 1. Vesicularia. | <i>H. vesiculare</i> , Schw. |
| 2. Glossophylla. | <i>H. radiculosum</i> , C. M. |
| 3. Cymbifolia. | <i>H. Auberti</i> , Schw. |
| 4. Cyclophylla. | <i>H. trichomanoides</i> , Schr. |
| 5. Pulchella. | <i>H. denticulatum</i> , L. |

B. Serpo-hypnum—

H. serpens, L.

C. Illecebro-hypnum—

- | | |
|--------------------|-----------------------------------|
| 1. Cochlearifolia. | <i>H. cochlearifolium</i> , Schw. |
| 2. Cirrosa. | <i>H. cirr. sum</i> , Schw. |
| 3. Illecebra. | <i>H. illecebrum</i> , L. |
| 4. Cuspidata. | <i>H. cuspidatum</i> , L. |

D. Sciuro-hypnum—

H. velutinum, L.

E. Chryso-hypnum—

- | | |
|-----------------|---------------------------------|
| 1. Polymorpha. | <i>H. chrysophyllum</i> , Brid. |
| 2. Reptantia. | <i>H. reptans</i> , Sw. |
| 3. Flagellaria. | <i>H. flagellare</i> , Dicks. |
| 4. Squarrosa. | <i>H. squarrosus</i> , L. |

F. Drepano-hypnum—

- | | |
|--------------------|--------------------------------|
| 1. Incurvata. | <i>H. incurvatum</i> , Schrad. |
| 2. Palustria. | <i>H. palustre</i> , L. |
| 3. Hamulosa. | <i>H. hamulosum</i> , B. & S. |
| 4. Cupressiformia. | <i>H. cupressiforme</i> , L. |
| 5. Adunca. | <i>H. aduncum</i> , L. |
| 6. Filicina. | <i>H. filicinum</i> , L. |

G. Rhyngo-hypnum—

- | | |
|----------------------------|------------------------------|
| 1. Serrulata. | <i>H. serrulatum</i> , Hed. |
| 2. Muralia et rusciformia. | <i>H. murale</i> , &c. |
| 3. Pungentia. | <i>H. pungens</i> , Hed. |
| 4. Cæspitosa. | <i>H. cæspitosum</i> , Wils. |
| 5. Tenuirostria. | <i>H. demissum</i> , Wils. |
| 6. Prælonga. | <i>H. prælongum</i> , L. |

H. Cyрто-hypnum—

- | | |
|------------------|-------------------------------|
| 1. Rigodium. | <i>H. implexum</i> , Kze. |
| 2. Pseudoleskea. | <i>H. catenulatum</i> , Brid. |
| 3. Tamariscella. | <i>H. abietinum</i> , L. |

I. Dendro-hypnum—

- | | |
|-----------------|------------------------------|
| 1. Flabellaria. | <i>H. fasciculatum</i> , Sw. |
| 2. Comosa. | <i>H. comosum</i> , Labil. |
| 3. Neckeroidea. | <i>H. alopecurum</i> , L. |
| 4. Rigida. | <i>H. rigidum</i> , Hensch. |
| 5. Arbuscula. | <i>H. arbuscula</i> , Hook. |
| 6. Stolonifera. | <i>H. myurum</i> , Poll. |
| 7. Splendentia. | <i>H. splendens</i> , Hed. |

The Amphicarpi have peculiar foliaceous appendages, and their position among the other moss-families has been very unsettled. Gamophylleæ correspond to Fissidentaceæ, and, as the author well observes, the amplexicaul part is not a cleft portion of the leaf, nor an auricle or lamina appended to it, but truly an independent organ or Tegumentum akin to stipules, which has become organically united to the vertical leaf. Heterophylleæ comprise only *Schistostega*, in which normal leaves are found only on the barren stem, those of the fructiferous stem being regarded as stipular leaves.

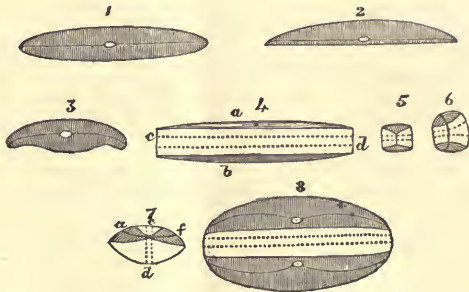
Hypophylleæ correspond to the elegant frondiform group of Hypopterygiaceæ, which have a series of peculiar stipules attached to the underside of the stem.

CONSPECTUS OF DIATOMACEÆ. THE GENUS AMPHORA.

PROF. H. L. SMITH.

We have just received a further instalment of Professor Smith's New Conspectus,* in which he treats of the genus *Amphora*. In none of the genera of *Diatomaceæ* is the structure of the frustule more difficult to understand; owing to the unequal development of the cingulum or connecting zone, the two valves of the frustule are always visible at the same time. Professor Smith's explanation will enable the student to comprehend the peculiar formation of the frustules of the species of this genus.

"Bearing in mind that all diatomaceæ are built after the same type, or are silicious boxes, as I have already indicated in the preface to the 'Synopsis,' a reference to the following diagrams will make the structure of *Amphora* plain. If we commence with a typical navicula form, as in figure 1, presented in side view, we have the median line (*raphe*) dividing the valve symmetrically.



Passing to figure 2, we have the typical *Cymbella*, the median line being nearer to one margin than the other, or dividing the valve unsymmetrically. The more convex margin is termed the dorsum, and the other the venter. Although these are objectionable terms, yet, as they have been extensively adopted, I shall continue to use them. If we pass now to figure 3, we have a more decided departure from the navicula, in the curved raphe, and the more or less curved ventral margin. Let us look at these frustules in front view; *a* and *b* are the striated valves, with central nodule, while the dotted lines *c d* represent the lines of suture (in all the figures the lines are dotted); fig. 5, the end view of the same frustule. While the valves, as seen in figures 4 and 5, are slightly convex, the sutural zone, or hyaline part, which has upon it the sutural lines, is of the same width at the two ends *c* and *d*, fig. 4,

* Published in "The Lens," No. 2, vol. 2.

and again at the middle of the frustule, as seen at fig. 5. Suppose, now, the sutural zone to become wider at one margin of the frustule when it passes from fig. 1 to fig. 2, and widest at the middle of the dorsal surface, it would now appear as in fig. 6, which is the end view of a *Cymbella*. We should find the frustule under action of gravity lying upon one of its valves when allowed to fall freely, and so it would present itself generally in side view. Imagine now an excessive development of the sutural zone, as in fig. 7 (which is an end view, as in fig. 6), the frustule would no longer rest upon one of its valves, as in figure 6, but upon the expanding connecting zone between the two dorsal surfaces, and generally we look down upon the frustule from *c* through to *d*, in which case both median lines, *e* and *f*, would be in view, and if the median line incurved towards *c*, as it does in many species of the *Amphoræ*, we would now have the view presented as figure 9."

The connecting zone being almost invariably presented to view, has led some authors to found specific differences upon it, but characters must be received with caution, and very possibly are valueless. Gregory's group of what he calls complex forms, are frustules, in which from some cause abortive attempts at division have taken place.

Professor Smith divides the genus into two sections.

A with median line incurved.

B with median line not incurved.

These are again divided and subdivided into twenty-three classes. He has only introduced one new species, with the following specific characters:—

A. undata, n.s. Doubly lyrate and somewhat angularly constricted at the middle. Nodule distinct, valves with several longitudinal lines, inflexed like the margins of the frustules, and converged at the ends; inner margin of valves slightly curved; connecting zone with longitudinal lines. Marine. Length .0017, breadth .00075, transversely striate, striæ fine, about 55 in. .001, dry frustule, straw colour.

In brackish grounds, near New Haven, Conn.

The number (121) of previously described species he reduces to 76. The following are the forms retained:—

Amphora lævis.

„ *ocellata.*
 „ *flexuosa.*
 „ *undata n.s.*
 „ *obtus.*
 „ *Milesiana.*
 „ *Magnifica.*
 „ *complanata.*
 „ *pulchra.*
 „ *binodis.*
 „ *sarnienus.*
 „ *undulata.*
 „ *proboscidea.*
 „ *oblonga.*
 „ *kamorthensis.*

Amphora inflexa.

„ *naviculacea.*
 „ *Donkinii.*
 „ *Proteus.*
 „ *spectabilis.*
 „ *robusta.*
 „ *angusta.*
 „ *ovalis.*
 „ *lyrata.*
 „ *angularis.*
 „ *sinuata.*
 „ *rimosa.*
 „ *nobilis.*
 „ *acuta.*
 „ *rectangularis.*

<i>Amphora vitrea.</i>	<i>Amphora coffeæformis.</i>
" <i>litoralis.</i>	" <i>lineata.</i>
" <i>ostrearia.</i>	" <i>costata.</i>
" <i>elegans.</i>	" <i>Terroris.</i>
" <i>decussata.</i>	" <i>monilifera.</i>
" <i>lævissima.</i>	" <i>apariena.</i>
" <i>delphina.</i>	" <i>salina.</i>
" <i>lineolata.</i>	" <i>exigua.</i>
" <i>hyalina.</i>	" <i>fluminensis.</i>
" <i>plicata.</i>	" <i>Reichardtiana.</i>
" <i>excisa.</i>	" <i>cymbifera.</i>
" <i>biseriata.</i>	" <i>Ergadensis.</i>
" <i>pusilla.</i>	" <i>granulata.</i>
" <i>sulcata.</i>	" <i>turgida.</i>
" <i>elongata.</i>	" <i>borealis.</i>
" <i>quadrata.</i>	" <i>crystallina.</i>
" <i>Gregorii.</i>	" <i>lanceolata.</i>
" <i>Grevilliana.</i>	" <i>cymbelloides.</i>
" <i>arcus.</i>	" <i>nana.</i>
" <i>obtecta.</i>	" <i>gracilis.</i>
" <i>semen.</i>	" <i>marina.</i>
" <i>pellucida.</i>	" <i>bacillaris.</i>
" <i>arenaria.</i>	" <i>Hohenackeri.</i>

Professor Smith has, we think, very rightly placed this genus in the family Cymbellæ, and says he may hereafter consider them as a subgenus at least of Cymbella. They are, in fact, exaggerated Cymbellæ.

The present paper is a very valuable monograph of the genus *Amphora*, and every diatomist will look forward with impatience to the future parts of the Conspectus. The author has undertaken a work of considerable labour, and he asks for the sympathy and assistance of all those interested in the study of the Diatomaceæ, and we hope that this request will be heartily responded to.

Norwich.

F. KITTON.

RABENHORST'S FUNGI EUROPÆI. Cent. XVI.—This publication contains many new and interesting species of fungi, from England, Germany, Holland, Greece, Italy, and other European countries. Amongst others are specimens of the following species:—*Lactarius controversus*, P.; *Marasmius Wynnei*, B. and Br.; *M. impudicus*, Fr.; *Irpex lacteus*, Fr.; *Hydnum aurantiacum*, A. and S.; *Polyporus Inzengæ*, Ces. and De Not.; *Merulius molluscus*, Somm.; *Cyphella endophila*, Ces.; *Peziza lasia*, B. and Br.; *P. aspidicola*, B. and Br.; *P. Chateri*, W. G. S.; *Helotium pruinosa*, Jerd.; *Schizothyrium Ptarmicæ*, Desm.; *Sordaria bombar-dioides*, Awd.; *S. Rabenhorstii*, Nssl.; *S. tetraspora*, Wint.; *Anthostoma trabeum*, Nssl.; *Rossellinia Rosarum*, Nssl.; *Cucurbitaria varians*, Haszl.; *Dacrymyces macrosporus*, Berk.; *Pleospora phragmispora*, Ces.; *P. comata*, Awd.; *Leptosphaeria suffulta*, Nees.; *L. culmifraga*, Awd.; *L. culmorum*, Awd.; *Stigmella Platani*, Fekl.; *Rhapidospora erythrospora*, Ouds; *Sphaerella bicalcarata*, Ces.; *Peronospora Chloræ*, De By.; *Apiosporum Lentisci*, Fekl.; *Synchytrium aureum*, Sch.; *Cladosporem Fluggeæ*, Thm.; *Puccinia heraclei*, Grev.; *P. helianthi*, Schw.; *Trichobasis hydrocotyles*, Cooke; *Cronartium rubicola*, Fischer; *Uredo armeriæ*, Duby; *Æcidium glaucis*, Rab., and many others. The new species are accompanied by descriptions, spore measurements, etc., and in a few instances by figures of the fructification. To the other specimens are appended descriptive notes, synonyms, locality, date, and the finder's name.

C. B. P.

Tab. 1. *A. pantherinus* is *Ag. excelsus* !
 „ 2. *A. Secretani* (not Fries) is *A. recutitus* !
 „ 4. *A. citrina* = *A. mappa*. Not the colour of *A. phal-*
 loides.
 „ 7. f. 2. Small specimen, in no way to be distinguished from
 A. muscarius.
 „ 7. f. 3. *A. strobiliformis* is *A. spissus*.
 „ 8. f. 1. scarcely differs from t. 1.
 „ 9. f. 1. *A. virosa*—perhaps *A. mappa*.
 „ f. 2. *A. asper*—absurdly so named, is a monstrous form
 of *A. validus*.
 „ 10. f. 2. not *A. muscaria formosa*, but *A. magnificus*.
 „ 11. *A. mappa*.
 „ f. 2. *A. solitaria* = *A. verna*.

LICHENS IN NORTH WALES.

The following Lichens deserve mention as occurring in the immediate vicinity of Capel Curig, North Wales :—

“Thallus obscure, obsolete or scarcely any visible; apothecia very slender; much dispersed; spores nigricant, oblongo-fusiforme, simple, or at length one to three septate. On branches of alder (especially the dead ones), also on *Sorbus aucuparia* and *Cerasus padus*.” Nyl. Lich. Scand.

This is an exceedingly minute species, easily overlooked. I have also found it in Shropshire.

Pilophoron fibula, Tuck, on a boulder near the Tan-y-bwlch Hotel.
Sphærophoron coralloides, Pers., in fine fruit.

Platysma triste, Webb. Rocks on the ascent to Moel Siabod.

Leconora ventosa, L. Moel Siabod.

Lecidea carneola, Ach. This was in tolerable plenty on old beech trees in the Glyder Wood, where I also gathered a few specimens in fruit of *Parmelia physodes*, L.

Opegrapha Chevalleri, Leight. On the bone of an animal in the crevice of a stone wall.

STRUCTURE OF THE GILL-PLATES OF AGARICS.

By J. DE SEYNES.*

Arriving at the gills, the cellular fibres, which have contributed to the formation of the parenchyma of the other parts, take a rectilinear direction, being inflected only outwardly towards the walls, in order to bear the hymenium. They fork and anastomose less than in the pileus; still, in *A. ceraceus* for example, we can see the anastomosed sub-hymenial cells fork frequently, almost reminding us by their delicacy and their general aspect of the mucilaginous tissues of *Exidia*. This system of cells is not the only one in this Agaric, and stronger cells, filled with a clear yellow liquid, which colours the parenchyma, sustain this delicate trellis-work. Most frequently we see the organs which constitute the hymenium inserted directly upon the fibriform cells more or less inflected in order to sustain them to their extremities; at other times, one, two, three, or four spherical or polygonal cells intervene. As for the hymenium, properly so-called, its study offers numerous points of interest; as for that of the mycelium, it is necessary, in order to find a precise and accurate description, to go back to a memoir of Mons. Lèveillé, read at the Philomathic Society, on the 12th of March, 1837, and inserted in the "Annales des Sciences Naturelles." The same name is given to the spore-bearing organs of the Agarics and to those of the Pezizas; certain plates, such as those of the memoir of Dutrochet upon *A. crispus*, show sufficiently how necessary it was that an earnest study of them should be made. The report to the Philomathic Society upon the memoir of M. Lèveillé gives a just idea of its importance.

The hymenium is not a membrane stretched upon the hymenophore; nothing can be better isolated than its cellular elements, which are simply side by side, and in contiguity. It results from this idea, well understood, that, as the organs of reproduction are those which individualise the living being, an Agaric may be regarded as an agglomeration of cellular fibres, varying according to the place through which they pass, and terminating in fructifying organs. Such was also the conclusion which Dutrochet deduced from his observations upon *A. crispus*.

Three cellular organs compose the hymenium of the exosporous *Hymenomycetes*. The basidium or formative and nutritive organ, analogue of the thecæ amongst the *Discomycetes*; a cell sometimes smaller than the basidium, sometimes of equal dimensions, which appears to me the analogue of the paraphyses; in fine, a cell which varies much in its form and dimensions, named cystidium by M. Lèveillé, and of whose functions the celebrated mycologist was unaware, but which he compares to the paraphyses, whilst the other cells are named by him proper cells of the hymenium. These

* Translated from his "Flore Mycologique."

latter, generally considered as simple terminations of the cells of the parenchyma, called by Hoffman sterile cells, and by Corda basiliary cells, have always, for this latter author, the same morphological signification as the paraphyses. Whilst giving them this name of basiliary spores, which would seem to indicate a situation inferior to that of the other organs, Corda has very well shown in his fine plates the real position which they occupy; one might even reproach him with having done it in a more regular and geometrical manner than occurs in nature. We readily establish this situation on the same plan, at the same height as the basidia. The structure is the same as that of the fertile basidia, there are cases even in which they are all transformed into fertile basidia ("Icon. Fung.," p. 46, heft. ii.). There are also *Pezizas*, amongst which we may show that, at an advanced period of their development, the number of thecæ is greater than that of the paraphyses, and in excess of the proportions which these two organs habitually bear towards each other. In the Agarics, among which the hymenium is neither too fertile nor too barren, the basidia are intermixed with the sterile cells, like the thecæ in the midst of the paraphyses. Amongst the *Discomycetes*, the paraphyses become lengthened in such a manner that they seem to lose their analogy with the thecæ; nevertheless, intermediate stages may be observed, and I have remarked in *Peziza eximia* a cell, which had commenced by having the dimensions of a young thecæ, arrested in its development, and take the attenuated form of a true paraphysis. The paraphyses appear sometimes to "specialise" in their functions, by charging themselves with the colouring principle which gives the hymenium its proper colour; but if the thecæ are transparent, it is because they have employed in the fabrication of the spores these same colouring matters, which can be discovered, although very diluted, amongst the latter; *P. aurantia* furnishes us with an example. Thus the paraphyses of the *Discomycetes* have their analogues in the cellules proper, and the sterile cellules of the hymenium, although they are frequently shorter than the fructifying organ, which is not the case with the paraphyses; but this question of size does not appear to us a sufficient reason for neglecting this analogy. "In the hymenium of the *Discomycetes*," says the celebrated mycologist of Prague, "the form of the envelope is the primary direction of life, and therefore it is that paraphyses and the thecæ are on the same level; in the hymenium of the basidia-bearing mushrooms, the increase is directed towards the exterior, and therefore the basidium is raised as well as the pollinaire above the mother cells, which replace the paraphyses, and form the surface of the hymenium.*"

* This consideration, expressed in a somewhat abstract manner, merits further development. If we understand it properly, it amounts to this: among the *Ascomycetes*, one might say a centripetal force retains the spore, and renders it the centre to which everything converges. In effect, the theca envelopes the spore; the paraphyses are raised, and have a tendency to envelope the theca which

BASIDIA.—The basidia are cells which vary within sufficiently restricted limits ; they are in general widened towards the summit, and more or less swollen or slender, rarely of an equal size from the base to the summit. Upon the hymenium of *Agaricus cernuus* we have seen basidia slightly compressed at the centre to take a biventral form, but this form is rare.

The basidia contain a granular liquid charged with little drops of oil, sometimes slightly coloured ; this liquid passes through the sterigmata or sporophores, little organs ordinarily four in number, superposed upon the basidia, and from the summit of which the spores originate. It is a sort of hollow funiculus, varying in length, sometimes slender, sometimes wide and funnel-shaped, and joined to the basidium by the wide part, sometimes describing a curve in the form of an ox's horn. During the early stage of the spore it is seen, as well as the sterigmata, to be filled with the granulations which were accumulated in the basidium. According to Corda, each sterigmata always develops one spore at a time, and sometimes one after another ; although direct observation has not yet demonstrated this fact to me, it seems to be very probable, for we see the old basidia, which have employed their granulous contents in the fabrication of spores, present nothing in their interior but a clear and transparent liquid.*

When a basidium bearing ripe spores ready to be detached is found still filled with the granulous plasma intended for the spores, it is to be presumed that it will serve for a second formation, the existing spores being entirely closed, and maintaining only a very feeble connection of endosmose with the sterigmata. We see, besides, some basidia, the plasma of which has been partly used, keep only three-fourths or a half of their cavity filled with granulations, as I have observed, and figured in a section of the gills of *Agaricus murinus* ; this diminution of the contents has very likely a connection with the number of spores formed. If we were able to assure ourselves that amongst the tetraspored basidia there are

they surround ; the receptacle takes a concave form to envelope the hymenium, and this form subsists among the species with hymenophores exposed on the exterior (*Helvella*, *Morchella*, &c.) by the formation of secondary or alveolous cavities.

Amongst the *Hymenomycetes*, the spore seems, on the contrary, endowed with a centrifugal force which urges it to the exterior of the basidium ; the basidium tends to raise itself above the hymenium—at least for the whole height of the sterigmata, and most frequently, for even much more. In fine, the receptacle tends always to bear the hymenium to the exterior, by offering it the convex surfaces of gills with pointed ramifications. The *Exidea* and the *Cyphellæ* seem to break this law by reason of their concave shape, but it is always verified in the hymenium, and we are accustomed to meet everywhere, in the organic kingdoms, these aberrations of types which seem designed only to concur in a sort of harmonic symmetry, by recalling to us, in certain sections, and among certain groups, forms which belong to others more or less removed from them.

* “ Whilst the basidium, fulfilling the function which is deputed to it, gives birth to the spores, it empties itself for their use of the plastic matters which were elaborated or accumulated within it, and, when the reproductive bodies have left it, it is only a colourless cell of an extreme transparency.”—(*Tulasne, Sur l'Organisation*, &c.)

but two generations, each of four spores, that would show another affinity with the thecæ of the *Ascomycetes*, which produce, as is known, for the most part eight spores. There is between the theca and the basidium such an analogue as to the terminal situation of the vegetable axis and to the production of liquid, granulous, oily contents, that we cannot but compare them completely, despite the differences in size and even of form, with products which are called upon to fulfil the same physiological function.

AMERICAN FERNS. In the "Bulletin of the Torrey Botanical Club," for March, 1873, Mr. D. C. Eaton describes two new species of the Transatlantic ferns:—*Asplenium Bradleyi* and *Notholæna Newberryi* (Eaton). The former of these plants has been found in Massachusetts and in Tennessee, by Prof. F. H. Bradley. In some of its more compound forms it is related to *A. montanum*, from which it differs in its larger size, more membranaceous texture, narrower outline of the fronds, and shorter stalked pinnæ. Some of the denser specimens also resemble somewhat *A. lanceolatum* of Europe. *Notholæna Newberryi* has been known to Mr. Eaton for some years, but has hitherto been considered either as *Cheilanthes tomentosa* or a white form of *Ch. Eatonii*. There is, however, no trace of an involucre, even in fruiting specimens, otherwise it bears a considerable resemblance to the ferns just referred to, but is whiter and much more tomentose. In *Notholæna* it comes nearest *N. mollis*, Kze, from South America, but is much more delicate, and differs in many other important respects.

FRESHWATER ALGÆ.—The April number of the "Quarterly Journal of Microscopical Science" contains a very interesting paper by Mr. W. Archer, in the form of a translation in abstract of Dr. Veit Brecher Wittrock's memoir of the "Freshwater Algæ of Gotland and Öland:" two islands in the Baltic Sea. The original paper, in Swedish, was communicated in 1872 to the Royal Academy of Stockholm, and contained an enumeration of some 190 species, accompanied by four plates illustrating the subject.

FRIES' EPICRISIS.—It is said that Prof. E. Fries has in preparation a new edition of his "Epicrisis Systematis Mycologici." The first edition of this work was printed at Upsala in 1836-38; since which time numerous and important additions have been made to the species, included under the *Hymenomycetes*, in this, as well as in other countries. The announcement of a new edition would therefore be welcomed by mycologists in all parts of the world.

MR. W. S. SULLIVANT.—We regret to learn from the "Journal of Botany" of the death of this eminent American botanist, which took place on the 30th April, at Columbus, Ohio, at the advanced age of 70 years. He was the author of several memoirs on the bryology of the United States, of numerous sets of actual specimens of American mosses, and of the "Icones Muscorum." His extensive bryological herbarium and library have, we understand, been left to the Herbarium of the Harvard University.

CRYPTOGAMIC LITERATURE.

BORNET, E. Researches on the Gonidia of Lichens, in the "Annales des Sciences Naturelles," vol. xvii. April, 1873.

BRAITHWAITE, Dr. R. On Bog Mosses: *Sphagnum papillosum*, Lindb., *S. Austini*, Sull. and *S. Angströmi*, C. Hart. in "Monthly Microscopical Journal," Nos. 53 and 55, May and July, 1873.

SMITH, H. L. Professor Smith's Conspectus of the Diatomaceæ, in "Monthly Microscopical Journal," for May, 1873.

MADDOX, Dr. R. L. Some remarks on a minute plant found in an incrustation of Carbonate of Lime, in "Monthly Microscopical Journal," No. 52, April, 1873.

KITTON, F. Professor Smith's Conspectus of the Diatomaceæ, in "Monthly Microscopical Journal," April, 1873.

GRÖNVALL, A. L. Bryological Notes in "Botaniska Notiser," May, 1873.

VENTURI, Dr. "Ueber, *Orthotrichum Shawii*," in "Hedwigia," May, 1873.

"BOTANISCHE ZEITUNG" for May, contains—P. Tomaschek, on the Law of Development of Diatoms; B. Hartig, on the Parasitism of *Agaricus melleus*; A. Geheeb, on *Neckera Menziesii* and *N. turgida*.

NYLANDER, W. Observata Lichenologica, in Pyrenæis Orient. in the "Flora," May, 1873.

KITTON, F. On *Aulacodiscus formosus*, *Omphalopelta versicolor*, &c., with description of a new species of *Navicula*, in the "Monthly Microscopical Journal," July, 1873.

ARCHER, W. On the Recent Views respecting the Nature of Lichens, and a Translation of Prof. Schwendener's paper on the Nature of the Gonidia of Lichens. Pl. ix. and x., in the "Quarterly Journal of Microscopical Science," No. LI., July, 1873.

SMITH, W. G. On a new species of Lactarius. *L. minimus*, in the "Journal of Botany," July, 1873.

BRAITHWAITE, Dr. R. Recent Additions to our Moss Flora, part vi., in the "Journal of Botany," July, 1873.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By THE REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 20.)

320. **Coryne Ellisii**. *B.*—Fusca stipite cylindrico sulcato, capitulo ovato. On decaying basswood logs, Potsdam. New York, Ellis. No. 851.

About $\frac{1}{4}$ of an inch high; stem cylindrical, grooved, head ovate; nearly even. Clearly allied to the last, but quite distinct. The whole plant is of one uniform tint. Descriptions of both these species from recent specimens are very desirable.

* **Rhizopogon luteolum**. *Fr.*—On sandy soil. Car. Inf. Curtis. Ravenel. No. 1485.

* **Rhizopogon rubescens**. *Tul.*—Boston, Sprague. No. 6250. Car. Inf. Ravenel, No. 1411, 1412. Curtis, No. 2577, 2578, 2765, 6417.

321. **Hydnangium Stephensii**, *B. & Br.*, var. **Ravenelii**. *B.*—Majus, extus albidum, obovatum vel subglobosum. On the surface of the earth in sandy woods. Dec. Car. Inf. Ravenel, No. 883. Curtis, No. 2576.

A much larger plant than the original form, and like that exuding a whitish milk when freshly cut. *Hydnangium Spraguei*, *B. & C.* No. 5394. New England. appears to be a metamorphosis of some Agaric, and not a true species.

* **Phallus rubicundus**. *Bosc.*—Alabama, Peters. No. 6344. Car. Inf. Ravenel, 986. No. 2035, 2643.

322. **Phallus Ravenelii**. *B. & C.*—Volvâ ovatâ parce fissâ, stipite deorsum attenuato, sursum subæquali; pileo elongato conico apice truncato membranâ tenui clauso lævi. Santee River. Car. Inf. No. 2574. Ravenel.

Volva ovate, but slightly split above; stem independent of the pileus, $1\frac{1}{2}$ inch high; pileus $1\frac{1}{2}$ inch high, truncate at the apex, even.

* **P. duplicatus**. *Bosc.*—Car. Inf. No. 2979. Connecticut, C. Wright. No. 5619.

* **P. indusiatus**. *Vent.*—On the ground in pine woods. Car. Inf., Ravenel. No. 1165.

* **Cynophallus caninus.** *Fr.*—On the ground, in grassy places. Car. Inf. No. 2573.

323. **Corynites Ravenelii.** *B. & C.*—Linn. Tr. xxi., p. 151, tab. 19. Volvâ demum stellata, capitulo conico vel obtuso apice perforata. Car. Inf. No. 2037, 2573.

Egg globose, $\frac{3}{4}$ of an inch in diameter. Volva bursting in from two to three lobes closely applied to the stem, then stellate; stem $1\frac{1}{2}$ -2 inches high, 4-5 lines thick, bright red, coarsely cribose, attenuated below, above confluent with the receptacle which is somewhat broadly clavate, sometimes conical, but always more or less obtuse, pervious at the apex, sometimes half as long as the stem.

324. **Corynites Curtisii.** *B.*—Volvâ sursum dilatâtâ bifidâ, stipite cum hymenophoro conico basi punctato confluyente subtriangulari. Connecticut, C. Wright. No. 5635.

From 2-3 inches high; volva dilated upwards, bifid, stem red, confluent with the conical, obtuse, subtriangular, pitted at the base, where not covered with the brown spores.

* **Dictyophora Dæmonum.** *Lév.*—Ohio, Lee. No. 281.

* **Cyathus Lesueurii.** *Tul.*—Connecticut, Wright. No. 5682. *Var. minor*, Tul. Brevis crucibuliformis eplicatus extus tomentosus vel subvillosus, sporis subglobosis, .0013 inch long. I believe that No. 414, 518 Car. Sup. are the same, but I have not found perfect spores.

325. **Cyathus Wrightii.** *B.*—Utero campaniformi eplicato extus stipiteo, sporis ellipticis. On the ground. Connecticut, C. Wright. No. 5650.

Bell-shaped; $\frac{1}{2}$ inch high, without any striæ; clothed with short tow-like pubescence; spores elliptic, .0006 inch long, .0004 wide.

* **Nidularia pulvinata.** *Schwein.*—Car. Inf. No. 1100, 1415.

* **Sphærobolus stellatus.** *Tode.*—On dead bark. Car. Inf. No. 1598.

326. **Sphærobolus epigæus.** *B. & C.*—Major globosus furfuraceus e mycelio filiformi oreundus. On red earth. Alabama, Peters. No. 4580.

Springing from a white threadlike mycelium, which incorporates itself with the soil and its accompanying moss. Globose, externally furfuraceous, splitting very irregularly. Of three species, from Schweinitz Herbarium, one *S. Corii*, Schwein., is *Stictis radiata*, *S. sparsus*, Schwein., is an imperfect *Stictis*, and *S. crustaceus*, Schwein., is another *Stictis*, with very long filiform sporidia. *ATRACTOBOLUS UBIQUITARIUS*, Schwein., is a very minute *Peziza*, with linear sporidia. *A. LUTESCENS*, Schwein., is the egg of some *Acarus*, but not grooved like the eggs of *Rhipignathus*.

327. **Secotium Texense.** *B. & C.*—Stipite ventricosus floccosus, pileo cinereo basi membranaceo, hymenio atro, sporis globosis laevibus minimis. Western Texas, Capt. Pope. No. 6375.



GEASTER MICHELIANUS W.G.S.

Half actual size; section of inner peridium real size. Spores $\times 700$ diam.

Fig. 1.

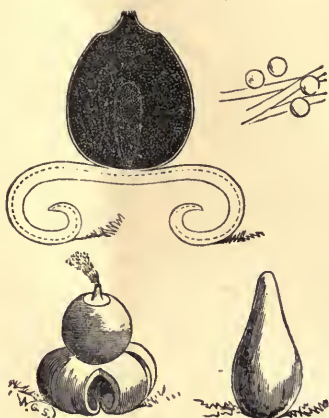


Fig. 2.



Fig. 1 GEASTER LAGENÆFORMIS. VITT.

Half actual size: section real size: spores $\times 700$ diam.

Fig. 2 GEASTER HYGROMETRICUS. P.

Half actual size: section real size: (A) plant in dried state. Spores $\times 700$ diam.

Stem about three inches high, obtuse below, swelling in the middle where it is $\frac{3}{4}$ inch thick; attenuated within the pileus; floccose, somewhat fulvous, pileus ovate, cinereous, $1\frac{1}{4}$ inch high and wide; membranaceous below, appendiculate; hymenium black; spores minute, globose, even, .0002 inch in diameter. *Polyangium vitellinum*, Schwein., is a *Physarum*.

* **Cauloglossum transversarium.** *Fr.*—Car. Inf. No. 267. In wet, sandy places. Dull brownish yellow.

* **Batarrea phalloides.** *P.*—On sand, about eight miles south of San Francisco. Prof. J. Torrey, No. 6527.

Head about 2 inches across, stem $\frac{1}{2}$ an inch thick.

* **Geaster rufescens.** *Fr.*—South California, Emory. No. 6398.

* **Geaster hygrometricus.** *P.*—New, Mexico Wright. Fort Carlton. Car. Inf. No. 37, 165, 2580. Texas, Drummond.

* **Geaster limbatus.** *Fr.*—Alabama, Peters. No. 6053.

* **Geaster fimbriatus.** *Fr.*—Car. Inf. No. 3025, 3853.

TWO SPECIES OF GEASTER.*

By WORTHINGTON G. SMITH, F.L.S.

Geaster Michelianus. *W. G. S.*—Outer peridium pale buff, thick, fleshy, generally splitting into five or six sub-equal laciniae, clothed on the outside with a thin, dark brown bark, which again splits into elegant honeycombed patterns; inner peridium pale slatey buff, spherical; mouth prominent, obtuse dentate, paler in colour than the body of the inner peridium; spores tuberculo-echinulate.—*W. G. Smith, in Gard. Chron. No. 18 (1873), with fig. G. tunicatus Michelianus, Erbar. Critt. Ital. Nos. 343 and 979. Mich. t. 100, f. 1. Cooke Handb. No. 1079.*

On the ground.

Spores .00014" diameter. When mature, and when the outer peridium bursts, this plants sometimes throws itself 9 inches away from its place of growth.

PLATE XIII.

Geaster lagenæformis. *Vitt.*—Outer peridium splitting to the middle, in nearly equal acuminate laciniae, inner stratum very thick, evanescent; inner peridium sessile, flaccid; mouth determinate, plano-conic, ciliato-fimbriate, columella rather long, clavate.—*Vitt. Monog. Lycop. t. 1, f. 2. Payer. f. 519, 520.*

On the ground.

In infancy the plant strongly resembles an antique jar with a narrow mouth, hence the specific name. Spores perfectly round and spherical, thus differing from the majority of Geasters; they measure .00012" diameter.

PLATE XIV.

* For the use of the figures illustrating this communication we are indebted to the kindness of the Editor of the "Gardeners' Chronicle."

AN ABSTRACT OF M. BORNET'S PAPER ON THE GONIDIA OF LICHENS.*

By W. PHILLIPS.

M. Bornet begins his paper by describing the structure of the thallus in Lichens, as consisting of a colourless filamentose tissue, termed *hypha*, and a coloured cellular portion, termed *gonidia*, remarking that for a long time past the great similarity of the gonidia to certain algæ had been observed, but that recent researches have thrown much additional light on the subject, tending to show this similarity to be not merely superficial or confined to a few isolated instances. M. Schwendener, in his various papers on the subject, has traced the resemblance of the gonidia to eight types of algæ, four of which belong to the group *Nostocaceæ*, and three to *Chlorophyllophyceæ*.

Different methods have been suggested of accounting for the resemblance thus traced. Some have regarded it as a simple coincidence, others have looked upon the algæ which correspond with the gonidia as imperfect or sterile states of true lichens, while a third party have advanced the startling theory that a lichen is a complex structure consisting of a particular kind of fungus living parasitically upon an alga. M. de Bary was the first to suggest this theory, but it was M. Schwendener who gave it shape and threw around it an air of probability. This learned savant states that he saw the filaments of the lichen-thallus (the *hypha*) penetrate the fronds of different algæ (*Sirosiphon*, *Nostoc* and *Glæocapsa*); encompass the gonidia with a network, similar to that with which a spider entangles his prey, and in a certain number of genera (*Roccella*, *Arnoldia*, *Lempholemma*, and *Pannaria*) unite themselves to the gonidia by an actual junction.

M. Bornet aims at confirming this theory of parasitism, looking upon it as the only one capable of explaining satisfactorily all that has hitherto been observed, and attributes its non-acceptance among Lichenologists to M. Schwendener having failed to dwell, as much as he ought to have done, on the nature of the connexion existing between the *hypha* and *gonidia*, and the mode in which it is established. Here appears to be the whole gist of the question. To demonstrate the identity of gonidia with algæ is the first point; but it is not decisive, as is proved by the opposite interpretations of the fact by MM. Famintzin and Baranetzky, who equally with M. Schwendener admit this identity. It is indispensable to show that the relations of the *hypha* to the *gonidia* are such as necessarily imply the idea of parasitism, and that these relations cannot be otherwise understood. To this point M. Bornet specially directs his observations, candidly admitting that it is one of the most difficult investigations that can be met with in the whole study of microscopic anatomy.

* "Annales des Sciences Naturelles," 5e série, tome xvii., 1er Cahier.

M. Bornet passes in review the principal genera of the *Algæ* which he meets with in Lichens. In the first place he examines such as contain chlorophyl (*Trentepohlia*, *Phyllactidium*, *Protococcus*), and in the second place those which contain phycochrome (*Scytonema*, *Stigonema*, *Nostoc*, *Glæocapsa*).

Algæ coloured by Chlorophyl. *Trentepohlia*, Mart, comprises small *algæ* of the group *Conserva*, branched like *Cladophora*, from which they are chiefly distinguished by not inhabiting water. They are universally distributed on bark, wood, rocks, and mosses, attaining their greatest development in moist and shady places. Their beautiful orange colour, which becomes grey when kept for some time in the herbarium, their odour of violets, or rather of *Cantharellus cibarius*, which they retain after keeping, make them easy of recognition. The great resemblance of *Trentepohlia umbrina* to the gonidia of several *Graphideæ* and *Verrucariæ* has been recognised by M. de Bary. M. Schwendener has confirmed the fact, and mentions moreover the genus *Roccella*, as offering the same peculiarity. M. Bornet has traced this resemblance in 13 genera of Lichens:—(1.) *Roccella tinctoria*, Ach., *R. phycopsis*, Ach., *R. fuciformis*, Ach. (2.) *Lecanora*, Ach. (sp. plur.). (3.) *Dirina repanda*, Nyl. (4.) *Cænogonium Linkii*, Ehrnb., *C. conservedes*, Nyl. (5.) *Byssocaulon niveum*, Montg. (6.) *Lecidea lutea*, Schær, *L. microsperma*, Nyl. (7.) *Graphis elegans*, Ach., *G. contexta*, Pers., *G. heterospora*, Nyl. (8.) *Opegrapha varia*, Pers., *O. herbarum*, Montg. (9.) *Stigmatidium crassum*, Duby. (10.) *Arthonia cinnabarina*, Wall. (11.) *Melaspilea arthonioides*, Nyl. (12.) *Chiodecton myrticola*, Fée., *C. nigrocinctum*, Montg. (13.) *Verrucaria nitida*, Schrad.

It would be premature to make a list of species of *Trentepohlia* found associated with lichens, the species being as yet ill-defined, and the lichens themselves too imperfectly known, as regards this enquiry, to do so with sufficient precision. It is nevertheless certain that different species furnish gonidia to lichens, some of the gonidia having more or less affinity with *Trentepohlia umbrina*, under which name they may be provisionally placed.

If a section of the bark be made on which grows *Opegrapha varia*, Pers., selecting the part where the white stain of the thallus is not very conspicuous, the thallus will be seen to be composed of a loosely compacted tissue of filaments and yellow oval gonidia containing red-brown granules. On careful examination the hypha will be seen to extend beyond the apparent thallus, the threads diminishing in quantity, so that isolated fibres may be traced,

In the same part of the bark other filaments may be seen—of a transparent green, much larger than the hypha, formed of cells placed end to end, lightly attached at each articulation. The arrangement of these cells and the mode of their increase show that they belong to *Trentepohlia*. On the confines of these two vegetations we meet with some spaces where the hypha and the

Trentepohlia are mixed in such a manner that they present themselves in the best condition for observation. The threads of the hypha fix themselves to the alga upon some part, it being perfectly indifferent whether the part be young or old, and put themselves in contact with individual cells. Often one portion only of the algal-filament, or one cell only, is touched by the hypha; but more frequently the hypha applies itself to the surface, follows all the sinuosities of its contour, gradually throwing out lateral branches which encompass, as with arms, portions more or less large of the cells they touch. The vegetation of the hypha is stimulated by contact with the *Trentepohlia*, the points of contact swelling and extending, and its cells becoming shorter, produce numerous branches, which ultimately surround the alga with a dense network. The threads of the hypha often lie in the spaces where the cells of the *Trentepohlia* join each other, from which there results a constriction, causing a breaking up of the algal-filaments into fragments of different length. These the hypha transforms into gonidia, exactly similar to those in the adult thallus of the *Opegrapha*.

There is nothing to be seen in any part of the thallus at any period of its growth to indicate that the *Trentepohlia* may be produced by the hypha. On the contrary, the extreme irregularity of the first connexion established between them excludes the possibility of such a thing, besides which they vegetate in an inverse way, and it is often the last-formed cell of the alga which is seized on by the hypha.

Verrucaria nitida (Schrad.) and *Roccella phycopsis* (Ach.) furnish excellent illustrations of the same facts.

Amongst exotic Lichens, *Chiodecton nigrocinctum* Montg., *Lecidea microsperma* Nyl., *Byssocaulon niveum* Montg., and *Cænogonium*, were examined, and contained gonidia of *Trentepohlia*, different from those enclosed in our indigenous species.

Cænogonium Linkii Ehrenb. presents peculiar facilities for studying this subject. The thallus is composed of articulated filaments, of a greyish-yellow in the herbarium, surrounded and held together by a network of colourless and much finer filaments belonging to the hypha. M. Schwendener regards the articulated filaments as those of an Alga allied to *Cladophora*, but M. Bornet considers them allied to *Trentepohlia*, and says that he has seen them invaded by the hypha from their base upwards, the lower cells being completely enveloped by a dense network, while the upper ones were free. He has observed also, in some instances, the hypha attacking the algal filament a considerable distance above its base, leaving the inferior cells untouched.

Phyllactidium, Kütz., he considers furnishes the gonidia to *Opegrapha filicina*, Montg., the hypha of the lichen invading the alga at an advanced stage of its development. He also conducted a

series of experiments with *Protococcus viridis*, Ag., on which were sown the spores of *Parmelia parietina*, Ach., with a view of showing that the hypha produced from these spores attached itself to the isolated cells of the alga, or to small groups of them, rejecting other bodies in their vicinity.

M. Bornet, in the second place, takes into consideration Algae coloured by phycochrome, which are distinguished from the preceding, not only by their bluish-green colour, but also by the constant absence of a cellulose membrane, properly so called. They are widely distributed, supplying what are known as *glauconidia*, and constituting the greater part of the thalli of *Phycolichenes*. Their cells are diffused, grouped in colonies, or disposed end to end in moniliform filaments.

The following are the genera of these algæ met with in lichens :—*CALOTHRIX*, Ag., furnishes gonidia to *Lichina confinis* and *pygmaea*, Ag. *SCYTONEMA*, Ag., to *Ephebella Hegetschweileri*, Itzigs; *Stereocaulon ramulosum*, Sw. (cephalodia); *Pannaria hypomelæna*, Nyl.; *P. triptophylla* var. *nigra*, Nyl.; *Cocco-carpia molybdea*, Pers.; *Erioderma unguigerum*, Nyl.; *P. Dictyonema sericeum*, Montg. *LYNGBYA*, Ag., to *Stereocaulon ramulosum*. *NOSTOC*, Vauch., furnishes gonidia to the following genera amongst the gelatinous lichens :—*Collema*, Ach., *Arnoldia* and *Physma*, Mass.; *Leptogium*, Fr.; *Obryzum*, Wallr.; and to the cephalodia of *Stereocaulon*, to *Nephromium*, Nyl., *Stictina*, Nyl., and to a certain number of *Pannariæ* amongst the stratified lichens. *STIGONEMA*, Ag., furnish gonidia to *Lichenosphæria Lenormandi*, Born., *Spilonema paradoxum*, Born., *Ephebe pubescens*, Fr., and to the cephalodia of *Stereocaulon furcatum*, Fr. *GLÆOCAPSA*, Kütz., serves to form *Synalissa* and *Omphalaria*, D.R., *Phylliscum*, Nyl., *Cora*, Fr., and is met with in certain cephalodia of *Stereocaulon*.

M. Bornet says he has established the presence of glauco-gonidia in the following 23 genera of lichens :—*Ephebella*, Itzigs, *Lichenosphæria*, Born. Mscr.; *Spilonema*, Born.; *Ephebe*, Fr.; *Lichina*, Ag.; *Synalissa*, D.R.; *Paulia*, Fée; *Omphalaria*, D.R.; *Phylliscum*, Nyl.; *Collema*, Ach.; *Leptogium*, Fr.; *Stereocaulon*, Schreb. (cephalodia); *Nephromium*, Nyl.; *Peltigera*, Hoffm.; *Stictina*, Nyl.; *Psoroma*, Fr.; *Pannaria*, Del.; *Coccocarpia*, Pers.; *Erioderma*, Fée; *Heppia*, Næg.; *Cora*, Fr.; *Dictyonema*, Ag. (= *Dichonema*, N. ab. Esnb.); *Verrucaria*, Pers.

In some species of lichens the hypha predominates in the thallus, there being only a thin stratum of gonidia below the cortical layer; while in the others the gonidial element predominates. This difference, M. Bornet thinks, corresponds, as a rule, with the mode in which the alga is invaded by the hypha. In the former, the hypha applies itself rather to the surface of the alga than to the interior, destroying its normal form, and giving the appearance of *Trentepohlia* and *Protococcus*; while in the latter, the hypha is projected

into the frond itself, that is into the interior of the case, or gelatine, which unites the cells together.

Amongst those lichens enumerated, in which the hypha applies itself to the surface of the alga, may be mentioned *Stereocaulon ramulosum*, Sw., the cephalodia of which were found by M. Bornet on dissection to contain long flexuous filaments of the character of *Scytonema*, which had been taken up and encompassed by the hypha; also *Coccocarpia molybdea*, Pers., in the young fronds of which were found moniliform gonidia, disposed in long parallel threads, in which it was impossible to avoid recognizing the similarity to a *Scytonema*, such as were found scattered upon the bark on which the lichen had grown.

Amongst the lichens he mentions in which the hypha penetrates into the interior of the alga, we have only space for one species, viz., *Arnoldia minutula*, Born. (sp. nov.) This lichen is very small, scarcely visible to the naked eye, pyriform or oblong, growing on the ground. On examining a thin section, the chaplets are seen to present here and there (independent of the heterocysts) some cells much larger than others, surrounded by a thick membrane. To each of these cells is fixed a short filament, a part of the general network of the hypha. The modification which these cells experience, shows the contact between them and the extremity of the inserted filament is not accidental, but that the hypha exercises on the gonidia an energetic action. Under its influence the cell becomes much enlarged, and surrounded with a thick membrane, which the ordinary cells do not possess; this is followed by a change in the colouring matter, which separates into a grumous mass in a colourless fluid, and the side of the cell opposite the point of attachment shrivels up, till the gonidium becomes a mere dead membrane. These phenomena begin the moment the extremity of a hypha-filament comes in contact with an algal cell.

In conclusion, M. Bornet considers he has established the two following propositions:—

1. Every gonidium of a lichen may be referred to a species of Alga.
2. The connexion of the hypha with the gonidia is of such a nature as to exclude all possibility of one organism being produced from the other, and that the theory of parasitism can alone explain it satisfactorily.

M. Bornet's Paper is illustrated with eleven coloured plates of microscopical dissections which assist very considerably the elucidation of his theory.

WOOLHOPE NATURALISTS' FIELD CLUB.—The annual meeting of this Club, which is devoted to Fungology, will be held at Hereford, on Tuesday, 14th October, 1873.

STRUCTURE OF THE GILL-PLATES OF AGARICS.

By J. DE SEYNES.

(Continued from Page 31.)

CYSTIDIUM.—The cystidium is a cell generally larger than the basidium, and which varies much in its forms; originating from the parenchyma at the same level, or a little lower than the other elements of the hymenium, we see it raise itself straight and solitary, sometimes as a simple sterile cell a little larger, sometimes in a cone more or less long or slender, sometimes bearing at its extremity a little sphere (*A. melinoides*, *A. sulcatus*), sometimes dividing itself, or again growing rotund, like a leathern bottle. This organ does not exist amongst all the *Hymenomycetes* and the Agarics, notwithstanding it has been indicated by Corda as being the male organ, the antheridia, and he has given them the name of pollinaire, which has been accepted by Mr. H. Hoffmann, although this author refuses to attribute to them the same signification. It appears to me, in fact, difficult to accept this interpretation. Pretty numerous observations of these organs, some of them undertaken without even knowing the hypothesis of Corda, led me to an altogether different conclusion, and permit me to see, in the cystidia, only organs returned to vegetative functions, by a sort of hypertrophy of the basidium. Following Corda, fecundation is effected by means of a viscous liquid issuing from these organs; but, if we remark that the examples of this kind of fecundation are taken from mushrooms (*A. rutilus*, *viscidus*, *mucosus*), all the vegetative portions of which are viscid, or have a tendency to become so in damp weather, we shall see nothing surprising in the cell belonging to them having the same property and agglutinating like the spores; there is nothing special in this; we should be tempted, on the contrary, to see in it an argument in favour of our thesis, and to suppose from that that the cystidia are always allied to the simple organs of vegetation. Amongst the milky *Mycenæ* (*A. galopus*) which have besides organs of reproduction very different from those of the *Lactarii*, the cystidia shew themselves identical with those of the *Lactarii*; amongst the *Plutei* they take the form of basidia to such an extent, that were it not for their dimensions we should take them for true basidia; divided into short horns at the summit, they seem thus to have preserved the sterigmata. The passing of one of these organs to the other has been very well pointed out by M. H. Hoffmann, and figured in particular in the *Ag. albo-brunneus*. (Bot. Zeit. 1856, p. 139.) At other times the form of the cystidium approaches that of the cells of the parenchyma; in a new Agaric, *Agaricus sulcatus*, I have observed the cystidia forming little cylinders with swollen, spherical extremities, and that is exactly the form which the vegetative cells in the pileus and the gills affect; many have the form of simple

bristles. These observations have led me to regard these organs disseminated upon the gills or frequently agglomerated near the margin, as hypertrophied basidia, returned to the functions of organs of vegetation, as we see abnormally a carpel to become a leaf. We are thus brought back to the first idea of Micheli, who called them sterile flowers, proposing only for their usage an interpretation diametrically opposed to his own. The cystidia appear to me to fulfil to the gills, the same office that the ring fulfils between the pileus and the stem; these two organs of the same nature transmit, at their contact, prolongations which bind them together; the gills organs of the same nature, and adjacent, have a tendency to send out prolongations to bind the one to the other. A certain number, obeying this law, are lengthened, and are diverted from their original use; but as the ring may be very much developed or fugacious and rudimentary to such an extent that it seems to exist only as a reminder, or is altogether wanting, so the cystidia may be wanting, or take such a development that they are visible to the naked eye; they fulfil, in certain cases, the functions of trabecules so well, that in separating the gills of *Agaricus atramentarius*, not entirely expanded, the gills divide into two longitudinal portions, instead of separating the corresponding faces of two different gills. This phenomenon is very apparent, and Delile, who was unacquainted with the cystidia, had noted the existence of fibrous prolongations binding the gills of this Agaric.

It is natural to ask whether we can take advantage of the observation of different forms of cystidia for the classification of the Agarics; M. H. Hoffman concludes not.

We know that there is little agreement between the form of the cystidia (*pollinaire*, Hoff.), and the greater part of the sections; since they cannot be considered as organs of fecundation, and as their analogy with epidermal productions or organs of simple vegetation is established, one can understand *à priori* that their importance diminishes.

Nevertheless, if we consider them from the point of view of the dominating form amongst a group, we shall perceive that there are still some comparisons to be effected, and that it is necessary to take account of this element of diagnosis, more especially as the observations made on this subject are still few in number, and, because, on the other hand, the sections more or less in acceptance at the present time amongst the Agarics generally, may very likely not represent their true divisions very faithfully.

Thus regarded, the hymenium, which has not yet offered an organ which we may suppose in reality to be the male organ, is reduced to great simplicity: one sole and self-same organ is the basis of it; according as it experiences an arrest of its development, as it grows and fructifies, or as it becomes hypertrophied, it gives us a paraphysis, a basidium, or a cystidium; in other terms, atrophied

basidium, normal basidium, hypertrophied basidium, these are the three elements which form the hymenium. Does it develop either outside the hymenium, or on the hymenium, at a time or in a part which has not yet been discovered, organs which yield pollen, spermatia, antherozoids, or any other fecundating agent? This is what remains to be discovered.

The mode of the insertion of the basidium, or of the different organs of the hymenium upon the sub-jacent tissues, conforms to two types; but these differences are less marked in the hymenium of the *Basidiospores* than in that of the *Thecaspores*. In these last it is easy to recognise these two types, which present themselves thus. In the first, and that which appears to us the most distributed, the theca, attenuated at its base, appears to have, when it has been isolated, a little pediform swelling, or, if you please, an extremity slightly recurved, provided with a claw, recalling somewhat the form of the crutch-shaped cells of M. H. Hoffman. It is by this little swelling that the theca is implanted upon the sub-hymenial cell. The insertions of this form offer, in section, a certain regularity. In the second type the theca is again attenuated at the base, but it gives place directly to an elongated,* fine, tubular cell which loses itself in the cellulous parenchyma of the *Peziza*. There is then, at the base of the hymenium, a complication which does not present at all the same aspect as the sub-hymenial tissue of the other *Pezizas*. The paraphyses always conform to the same mode of insertion as the thecae to which they are adjacent, and their homology thus receives from it a confirmation.

FUCKEL'S CLASSIFICATION OF THE SPHÆRIACEÆ.

By CHARLES B. PLOWRIGHT.

Many attempts have been made to classify the various forms which are included in this extensive order; since the genus, from which it takes its name was proposed by Haller, more than a century ago. It is not intended historically to enumerate any of these, but it should be borne in mind, that each successive author would naturally tend to adopt, or at any rate be influenced by, those suggestions of his predecessors, the convenience of which experience had demonstrated. We, in England, use almost exclusively the system proposed by Fries, somewhat modified; and so familiar have we all become with it, that many years will probably elapse before we shall desire to change it. Our Continental brethren, however, have of late years introduced a multitude of new genera, many of which have been extensively adopted, and it may possibly not be uninteresting to compare some of the more important of these with our own. With this in view it is proposed

* At least exteriorly, for there is always an internal wall of separation.

to give a brief account of the system employed by Fuckel in his *Symbolæ Mycologicæ*,* in which are adopted many of the more important genera of Tulasne, De Notaris, Nitschke, Rabenhorst, etc.

In speaking of the Sphærias generally, Fuckel observes that they all probably pass through various stages of development; in a few instances these are known to consist of the Conidia, Spermogonia, Pycnidia, and the Ascophore. It must, however, be admitted that in very many more cases nothing whatever is known of their earlier conditions, and at present but little help can be derived from this source.

The Sphæriacei are, in the first instance, separated into two very unequal divisions, by the nature of the matrix upon which the individual species subsist, viz., into the *Vegetabilicoli* and the *Fimicoli*, the former embracing some 64 genera and the latter eight only.

The Vegetabilicoli are divided into two nearly equal groups, the Simple and Compound. According to the system commonly adopted in this country,† the 290 species of our Simple Sphærias are divided into 16 genera, about 200 being located in the genus *Sphæria*, while the remaining 90 are distributed over the other 15 genera.

The Simple Sphærias are divided by Fuckel into 37 genera, which are arranged in six groups, called respectively the *Sphæriæ*, *Ceratostomeæ*, *Pleosporeæ*, *Lasiosphæriæ*, *Massariæ*, and *Lophios-tomeæ*.

The first group commences with Fries' genus *Sphærella*, containing nearly sixty members. This is followed by the genus *Sphæria*, composed of 40 species, of which it is remarked that "although it at present contains some very heterogenous forms, yet future investigations into the lower states of their fructification, will probably afford more satisfactory data, on which to base their separation into genera." Amongst its contents are found such species as *Isothea pustula*, *rhytismoides* and *immunda*, *Sphærella rusci* and *Sphæria corni-sueciæ*.

The second group, or *Ceratostomeæ*, includes *Gnomonia*, a genus of Epiphyllous Sphærias characterised by their elongated ostiola; it corresponds with the division *Follicolæ* of Fries, and, consequently, contains *Sphæria fimbriata*, *tubæformis*, *setacea* and *gnomon* (= *G. vulgaris*, De Not.). *Linospora* is a small genus, in which *Isothea saligna* (Berk.) is located; *Rhaphidospora*, a genus of Caulicolous Sphærias, answering to the division which has long, thread-like, more or less articulate sporidia, includes *Sp. rubella*, *herpotricha* and *acuminata* (= *R. Carduorum*, Tul.); *Ceratostoma*, the typical genus of this group, answers to Fries' division

* "*Symbolæ Mycologicæ*." By L. Fuckel. Wiesbaden. 1869.

† The classification here referred to, as well as the nomenclature employed, are those used in the "*Handbook of British Fungi*."

of the same name, *Sp. pilifera* and *cirrhusa* being amongst its most important members.

The third group, or *Pleospora*, takes its name from the principal genus *Pleospora*, which is made to embrace more species, according to Fuckel's limitation of it, than it is generally regarded as doing. For not only are those species possessing brown, muriform sporidia, placed here (*Pleospora genuina*, of which *Sp. herbarum* is the type), but also those with fusiform septate sporidia, such as *Sp. dolium*, *acuta* and *agnita*, which are classed by De Notaris in his genus *Leptosphaeria*, and in addition to these it contains *Sp. arundinacea* and *culmifraga*. A new genus, *Didymosphaeria*, receives *Sp. epidermidis* and *diplospora*.

In the fourth group (*Lasio-sphaeriæ*), the typical genus *Lasio-sphaeria*, originally proposed by De Notaris, is now made to embrace only those of the *Villosæ*, which have coloured, septate sporidia, such as *Sp. racodium*, *hirsuta* and *hispida*; while in *Leptospora* are placed those with undivided sporidia, as *Sp. ovina*, *strigosa* and even *Sp. spermoides*. A new genus, *Trichosphaeria*, receives *Sp. pilosa*. *Rosellinia* includes the species, with simple brown sporidia, similar to those found in the genus *Hypoxylon*, such as *Sp. aquila*, *mammæformis*, and *pulveracea*.

The fifth group (*Massariæ*) has only two genera—*Enchnoa*, in which are placed *Sp. lanata* and *glis*, and *Massaria* proper.

The sixth and last group (*Lophiostomeæ*), into which the genera of simple *Sphærias* are classed, commences with the *Lophiostoma* of De Notaris; *Melanomma*, in which the members have small, hard perithecia, such as *Sp. pomiformis* and *pulvis-pyrius*; *Teichospora*, with its brown muriform sporidia, may be regarded as being typified in *Sp. obducens*; *Trematosphaeria*, in some degree answering to the *Pertusæ*, and finishes with two genera (*Bertia* and *Bombardia*), containing but a single species in each—*Bertia moriformis* (*Sp. moriformis*) and *Bombardia fasciculata* (*Sp. bombardia*).

The division, *Compositi* differs from our own, not only in the greater number of genera into which it is divided, but also in containing several specific forms which we regard as simple *Sphærias*.

The first group of genera, *Cucurbitariæ*, contains the genus *Nitschkia*, consisting of three members—*Cucurbitaria cupularis*, *Sp. tristis*, and *Sp. exilis*. The two first of these plants are, as Fuckel regards them, closely allied, and differ in little else than in the size of the sporidia and in the number of nuclei they contain. It is possible that the first named may be identical with the *Sp. tristis** var. *Sporidiis Majoribus*, of Messrs. Berkeley and Broome. It should be observed that Fuckel is here speaking of the *Sp. tristis* of Persoon, Tode's plant he regards as *Sp. phæostroma*, Mont. A similar view, it will be remembered, was taken in the "English Flora," vol. v., part ii.

* "Annals of Natural History," vol. 7, No. 42, p. 435.

The genus *Valsa* is divided into sections after Nitschke :—*Eutypella*, *Euvalsa*, and *Leucostoma*. It contains some 35 species, although many members of the old genus *Valsa* are now located in fresh genera. Thus :—

<i>Valsa tiliæ</i> , Tul.	= <i>Hercospora tiliæ</i> , Tul.
<i>taleola</i> , Fr.	= <i>Aglaspora taleola</i> , Tul.
<i>leiphemia</i> , Fr.	= <i>Cryptospora liphæma</i> , Tul.
<i>fenestrata</i> , B. & Br.	= <i>Fenestrella princeps</i> , Tul.
<i>vestita</i> , Fr.	= <i>Thyridium vestitum</i> , Fekl.
<i>detrusa</i> , Fr.	= <i>Diaporthe detrusa</i> , Fekl.
<i>pulchella</i> , Fr.	= <i>Calosphæria princeps</i> , Tul.
<i>quaternata</i> , Fr.	= <i>Quaternaria Persoonii</i> , Tul.
<i>leucostoma</i> , Fr.	= <i>Valsa Persoonii</i> , Nke.

The genus *Diaporthe* (Nitschke) partakes in some degree of the characters of *Valsa* and *Diatrype*, and also includes a number of the Caulicolous Sphærias, it being the most extensive genus amongst the *Compositi*. In it we find *Diatrype pyrrhocystis*, *strumella*, *inæqualis*, *Valsa syngenesia*, *Innesii*, *Sphæria lirella*, *pardalota*, *vepris*, and *rostellata*.

Cryptosphæria, the genus originally proposed by Greville, receives *Sp. millepunctata*. Of the species usually included under *Dothidea*, those found upon living leaves and grasses are placed in *Phyllachora*; *Rhopoglyphus* receives *D. filicina*; *Homostegia*, *D. Piggottii*; *Melanops*, *D. melanops*; while the genus *Dothidea* is reserved for such species as *D. rosæ* and *ribesia*. The old genus *Rhizomorpha* is revived, and in it is placed *Thamnomycetes hip-potrichioides*, with a new species allied to it.

The Fimicoli, or, as they might be called, the *Coprophileæ*, are divided into three groups. In the first the sporidia are without appendages. *Coprolepa*, a genus somewhat analagous to *Hypoxylon*, in possessing a more or less distinct stroma, and *Hypocopra*, have their simple, dark brown sporidia enveloped in a gelatinous coating. In this latter genus is placed *Massaria fimeti* and *Sp. stercoraria*. Of the other members of this group *Delitschia* has uniseptate, *Sporormia*, tetraseptate, and *Pleophragmia*, polyseptate sporidia.

The second group have their sporidia appendiculated at one extremity. It consists of two genera—*Malinvernina* and *Sordaria*. *Cercophora* is the name given to a new genus, the members of which have their sporidia appendiculated at both extremities. *Xylaria pedunculata* is for some reason not classed with the Fimicoli, although, as Mr. Berkeley has long since indicated, it is closely allied to *Sp. stercoraria*.

The point upon which our arrangement is most open to modification certainly is, the great size of the genus *Sphæria*, especially with regard to the number of species included under the *Obtectæ*, and as there are few more convenient genera than *Pleospora*, *Rhaphidospora* and *Gnomonia*, we can but think their adoption would prove advantageous; while the host of minor genera, which various cryptogamists have from time to time proposed, averaging, as

they do, from one to five members, appear to us, unnecessary. Those generic distinctions too, based upon secondary forms of fructification, however scientifically accurate they may be, and however natural they may appear upon paper, will be found, it is feared, not to work well in practice, because they demand a more intimate acquaintance with the life history of each plant, than it is possible, in the first instance, always to obtain.

HERBARIUM MYCOLOGICUM ŒCONOMICUM.—The second fasciculus of 50 specimens has just been issued by Baron Thuemen. It fully equals in interest its predecessor, and amongst its contents are—*Puccinia Apii*, Cd. ; *Asparagi*, Link ; *Cerasi*, Cd. ; *P. coronata*, Cd., on the oat ; *P. Prostii*, Duby ; on the garden tulip (*Tulipa Gesneriana*). *Uredo Zeæ*, Desm., on the maize. This is probably the uredo form of *Puccinia Zeæ*, Pötsch ; *Uromyces Viciæ*, Fekl. ; *Fusarium Betæ*, Rabh. ; *Ustilago Sorghi*, Pass. ; a new species which infests the seeds of the millet (*Sorghum vulgare*) ; communicated by Prof. Passerini : *Sphærotheca Castagnei*, Lev. ; on *Hibiscus esculentus*, from Greece ; *Phacidium medicaginis*, Lasch. ; *Œcidium alliatum*, Rabh., on the shallot (*Allium ascalonicum*). A new species of *Hypoderma*, *H. longisporum*, Hartig., on fir leaves. *Ascochyta Tiliæ*, Lasch. ; *Uredo fragariæ*, Rabh. ; *Apiosporium Mali*, Wallr. ; *Cladosporium Fumago*, P., on vine leaves ; *Antennatula pinophila*, Fr. ; *Capnodium Persoonii*, B. & D., on hornbeam and lime leaves ; *Corticium amorphum*, Fr. In Bohemia this is stated to be very destructive to the young fir trees ; the affected trees usually perishing between the twelfth and sixteenth year. *Acalyptospora nervisequia*, Cast., on elm leaves ; *Exobasidium vaccinii*, Wall., on the cranberry ; *Torula chrysosperma*, Cd., on opium ; *Merulius lacrymans*, Fr., *Saccharomyces Cerevisiæ* Meyen. ; *S. Mycoderma*, Rees. ; and several other more or less important species.

THE HOLLYHOCK DISEASE.—During the months of June and July this was reported from different localities in England as having caused considerable damage to Hollyhocks. It is produced by *Puccinia malvacearum* (Mont.), a fungus not previously observed in this country, which was originally described by Montagne as occurring on the under surface of the leaves of *Althæa officinalis*. We have also received specimens on *Malva sylvestris*, from J. Hussey, Esq., of Salisbury ; Dr. Paxton, of Chichester ; and Mr. E. Parfitt, of Exeter.

TWO SPECIES OF FUNGI RECENTLY OBSERVED IN NORFOLK.

Puccinia Asteris. Fekl.—Sori seated upon yellow, then discoloured spots, hemispherical, brown; spores brown, ovato-oblong, apiculate; peduncles very long.—*Fuckel. Sym. Myc. p. 53.*

On both sides of the leaves and on the stems of *Aster tripolium*. Near King's Lynn. July, 1873. In tolerable plenty.

This is a very well marked Puccinia; the hemispherical sori are in their early stage surrounded by a yellow zone, and remain covered by the unruptured epidermis for some little time, which gives them a peculiar ashy grey colour. Dr. P. Magnus informs me this is the *P. Tripolii* of Wallroth, but the above name has been adopted on account of its more comprehensive character. Fuckel's plant was on the root leaves of *A. amellus*. I have a closely allied, if not identical species, on the leaves of some Aster, from Maine, U.S., from the Rev. E. C. Bolles.

Macrospora scirpi. Fekl.—Perithecia scattered, covered by the epidermis; ostium obtuse, slightly prominent; asci large, stipitate, subclavate, at first inflexed at the apex, then obtuse; sporidia oblong, obtuse, 5-septate, each loculus, except the two terminal, longitudinally divided, slightly constricted, pale yellow.—*Fekl. Symb. Myc. p. 140, t. iii. f. 12.*

On Typha. King's Lynn. May, 1873.

Regarded by Fuckel as the *Sphæria Scirpi* of Fries. A very different plant from *Sp. scirpicola*, D.C., in company with which it was growing.*

CHARLES B. FLOWRIGHT.

* I do not think that the above *Puccinia* can be separated from *Puccinia asterum*, Schweinitz. *Macrospora* is an unnecessary increase of genera, and belongs to *Pleospora*, if that be entitled to rank as a genus.—[ED. GREV.]

CRYPTOGAMIC LITERATURE.

HOFFMANN, H.—On *Geaster coliformis*, P. in the "Botanische Zeitung" for June, 1873.

GRONLUND, C.—Contributions to the Flora of Iceland (*Hepaticæ and Musci*), in "Botanisk Tidsskrift."

HANSEN, C.—On the *Diatoms* found in Slesvig, in "Botanisk Tidsskrift." Pts. 1 and 2. 1873.

SMITH, W.G.—On "Abnormal Mushrooms," with numerous figures, in the "Gardeners' Chronicle" for 26th July, 1873, pp. 1016-1017.

O'MEARA, REV. E.—On Recent Researches in the *Diatomaceæ*, in the "Journal of Botany," Aug., 1873.

CHURCH, A. H.—On the composition of *Lycoperdon giganteum*, Batsch., in the "Journal of Botany," Aug., 1873.

STIRTON, DR. J.—Additions to the Lichen Flora of New Zealand, in the "Transactions of the Glasgow Society of Field Naturalists," 1873.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By the REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 35.)

* **Geaster saccatus.** *Fr.*—Car. Inf. No. 1600. New York, Sartwell. No. 3458. Alabama, Peters. No. 3869, 3872. Ohio, F. G. Lea.

* **Geaster fornicatus.** *P.*—Car. Inf. No. 2301.

328. **Geaster radicans.** *B. & C.*—Peridio externo separabili demum fornicato e fibris radicantibus oriundo, peridio interno lævi brevissime stipitato; ore sericeo. Car. Inf. Ravenel, No. 953. Curtis, No. 3041.

Outer peridium 2 inches across; reddish, separable into two parts, the upper portion being ultimately lifted up, as in *G. fornicatus*; inner peridium about $\frac{3}{4}$ of an inch across, very shortly stipitate, smooth, reddish; mouth silky, as in *G. fimbriatus*; spores globose, minutely echinulate. The same species occurs in Cuba. No. 873.

* **Tulostoma fimbriatum.** *Fr.*—New Mexico. Rio Grande, Wright. No. 6370. Car. Sup., No. 983. Texas, Wright. No. 3151.

* **Tulostoma mammosum.** *Fr.*—New Mexico. Rio Grande, Wright. No. 6369. Fendler, No. 3096.

* **T. Tulostoma Meyenianum.** *Kl.*—New Mexico. Rio Grande, Wright. No. 3918.

* **Bovista lilacina.** *B.*—Hook, Lond. Journ., 1845, p. 64. Car. Inf. No. 2533.

329. **Bovista pila.** *B. & C.*—Subglobosa pallida subtiliter tomentosa, basi sterili nulla, capillitio sporisque brunneis. On the ground amongst grass, which adheres close to the peridium. Wisconsin, Lapham. No. 6213.

About $1\frac{1}{2}$ inch across; subglobose, pallid, very minutely tomentose; capillitium and globose shortly pedicellate even spores, bright brown, spores .0002 in diameter; pedicels about the same length, soon breaking off.

330. **Bovista stippea.** *B.*—Ellipsoidea sessilis; peridio externo tenuissimo albedo, interno spadiceo; capillitio stippeo spadiceo; sporis parvis pedicellatis. Texas, C. Wright. No. 3153.

Ellipsoid, longer diameter 2 inches, shorter, $1\frac{1}{4}$; outer peridium extremely thin; whitish; inner, bright reddish-brown; flocci very abundant, woven into a tough mass; spores few, pedicellate, .0002 in diameter. Unfortunately I have only a single specimen, the peridium, which is thin and papery easily splits and separates from the spongy mass within.

331. **Bovista circumscissa.** *B. & C.*—Minor subglobosa; peridio exteriore subcoriaceo secedente, interiore furfuraceo, ore subsericeo; sporis globosis minimis argillaceis. In gardens. Maine. Rev. J. Blake. No. 6315.

About $\frac{3}{4}$ inch in diameter; outer coat leathery, splitting off, leaving a ring-shaped portion at the base, inner furfuraceous; orifice minute, silky; spores globose, even, at length slightly rough, sessile, .00016 in diameter; clay-coloured.

332. **Lycoperdon calyptriforme.** *B.*—Minus e basi radicante oriundum; peridio ovato apice papillæformi furfuraceo, capillitio sporisque globosis lævibus argillaceis. Car. Sup. Curtis. No. 557.

About $\frac{1}{2}$ of an inch across, springing from a rooting base; ovate, with a papillæform apex, furfuraceous or minutely warty; threads and the globose even spores about .00016 in diam. clay-coloured.

* **Lycoperdon fragile.** *Vitt.*—Car. Sup. No. 124, 554, 559, 560, Closely resembling *Bovista lilacina*. *Lycoperdon cyathiforme*. Bose., is apparently the same. Car. Inf. Rav. No. 192.

333. **Lycoperdon Curtisii.** *B.*—Minus subglobosum pallidum verrucis echinatis exasperatum capillitio sporisque lævibus globosis argillaceis. Car. Sup. Curtis. No. 558. Connecticut, Wright. No. 5613.

About $\frac{1}{3}$ of an inch across, springing from a short rooting base; globose, rough with echiniform warts, pallid; flocci, and the smooth, globose spores, .0001 in diameter clay-coloured.

334. **Lycoperdon Wrightii.** *B. & C.*—Globosum, primum subtiliter echinatum, verruculis cito secedentibus glabrum ore sericeo apertum, capillitio sporisque globosis lævibus argillaceis. Connecticut, Wright. No. 5633.

Sessile, globose, $\frac{3}{4}$ inch in diameter, at first clothed with minute echinate warts, which soon fall off and leave the peridium smooth, with a minute silky orifice. Capillitium and spores .00016 in diameter; clay-coloured, but more inclined to cinereous in two foregoing species.

335. **Lycoperdon calvescens.** *B. & C.*—Subglobosum, primum echinato-verruculosum, verruculis cito secedentibus subtiliter velutinum; capillitio sporisque globosis lævibus argillaceis. Connecticut, C. Wright. No. 6366.

About $1\frac{1}{4}$ inch across, springing from a short rooting base, at first clothed with minute echinate warts, which soon drop off, and leave the peridium minutely velvety. Capillitium and even globose spores, .00016 in diameter; clay-coloured. The spores appear at first to be pedicellate, but if so the pedicels soon drop off.

* **Lycoperdon saccatum.** *Fr.*—New England, Sprague. No. 5388.

336. **Lycoperdon pulcherrimum.** *B. & C.*—Obovatum verrucis pyramidatis echinatis albis exasperatum, ore nullo, capillitio sporisque globosis laevibus pedicellatis olivaceis. Pennsylvania, Michener. No. 3933.

About 1 inch across, obovate, densely shaggy with white echinate pyramidal warts; smooth and plicate at the base; capillitium and spores .00016 in diameter; olive, pedicellate. A very beautiful species.

* **Lycoperdon cruciatum.** *Bostk.*—Rhode Island. Olney. No. 1846.

337. **Lycoperdon delicatum.** *B. & C.*—Basi spongiosa sterili stipitiformi arcte a capillitio flavo subgilvo discreta, peridio pruinoso furfuraceo. Pennsylvania, Michener. No. 3621, 3622.

About $2\frac{1}{2}$ inches across, bare more or less stem shaped $1\frac{1}{2}$ – $2\frac{1}{2}$ across, spongy, accurately separated as in *L. cælatum* from the capillitium; peridium pruinoso-furfuraceous, very delicate, capillitium with the globose even spores, .00016 in diameter yellowish here and there, inclining to pinkish. A very delicate looking species, with a stout base.

338. **Scleroderma Texense.** *B.*—Irregulare subfloccosum quandoque areolatum, basi subapiculato sporis e lilacinis brunneis. *Car. Inf.* No. 1392, 2208.

About 1 inch across, irregular, subglobose, somewhat apiculate at the base, sometimes wrinkled or areolate, floccose, spores lilac, .0006–.0005 in diameter. A singular and very distinct species. Originally gathered by Mr. Drummond in Texas, in whose specimens the spores are dark-brown and wider. I believe, however, that they increase in size after they fall.

* **Podaxon carcinomale.** *Fr.*—Rio Grande. New Mexico. Wright. No. 6371.

339. **Mitremyces Ravenelii**, *B. minor.*—Stipite, brevi, peridio, exteriori in areolas minutas rupto.—On the ground. Caesar's Head. Inf. Ravenel. No. 1837.

A small form, about $\frac{1}{3}$ of an inch high, with a very short or obsolete stem. The outer peridium breaks up into little areolate patches.

* **Mitremyces lutescens.** *Schwein.*—*Car. Inf.* Curtis. No. 695. Texas. Drummond.

* **Trichocoma paradoxum.** *Jungh.*—On *Laurus Caroliniensis*. Car. Inf. No. 2565.

340. **Reticularia affinis.** *B. & C.*—Effusa tenuis papillosa atropurpurea margine tenui; sporis oblongis; capillitio brevi ramoso, Berk., in Journ. Linn. Soc., v. x., p. 347. On dead trees which have not yet fallen. Car. Inf. No. 3012.

Effused, thin papillose, black-purple; margin thin; threads short, erect, branched; spores oblong, .0004-.00025 long.

341. **Spumaria Micheneri.** *B.*—Effusa reticulata gilva; sporis globosis magnis lævibus. On very rotten wood. Pennsylvania. Michener. No. 4110.

Effused, reticulate, pinkish yellow or slightly fulvous; spores globose, .0013-.001 in diameter. *S. licheniformis*, Schwein., is a state of *Didymium cinereum*.

342. **Diderma ochroleucum.** *B. & C.*—Gregarium congestum sessile, peridio exteriore ochroleuco, interiore albo; columella nulla; sporis atris; floccis albis. On bark. Pennsylvania. Michener. No. 4083.

Gregarious, crowded together; external membrane ochroleucous, internal white; columella none; spores black.

* **Diderma spumarioides.** *Fr.*—On moss. Car. Inf. No. 5001.

343. **Diderma concinnum.** *B. & C.*—Sessile lævissimum candidum nitidum fragilissimum intus rufulum; columella obscura, sporis aterrimis. On a minute moss running over very rotten wood. Car. Inf. No. 3021.

Extremely neat, brittle, looking like a little egg, quite even, white, pale rufous within; columella slightly developed; spores jet black.

* **Diderma stellare.** *P.*—On pine wood. No. 2171.

* **Angioridium valvatum**, *Fr.* Ind. Syst. Myc. *Diderma pallidum*. *B. & C.* On pine leaves. Car. Inf. No. 1972.

* **Didymium clavus.** *Fr.*—On dead leaves. Car. Sup. No. 251. Canada, Poe. No. 6137.

344. **Didymium erythrinum.** *B.*—Stipite æquali peridioque globoso cinnabarinis sporis atris, floccis albis. On pine wood.

Stem equal, vermilion, as is the globose peridium; spores black, flocci white. The pulverulent matter with which the peridium is clothed soon rubs off.

* **Didymium xanthopus.** *Fr.*—On dead leaves, &c. Car. Inf. No. 1176, 2040. Car. Sup. No. 245.

345. **Didymium proximum.** *B. & C.*—Stipite subæquali rufo penetrante e basi orbiculari oriundo; peridio globoso granulato albo, floccis albis. On dead pine leaves. Car. Inf. No. 2987.

Stem rufous, nearly equal, springing from an orbicular base, penetrating the globose white granulated peridium; flocci white. In this last character it differs essentially from *D. xanthopus*.

346. **Didymium Ravenelii.** *B. & C.*—Stipite subæquali lævi brunneo; peridio globoso umbrino; floccis sporisque nigris. Car. Sup. Sulphur springs. Ravenel. No. 1513.

Stem nearly equal, or somewhat attenuated, penetrating slightly, even, dark brown; peridium globose, umber, with a few very minute metallic scales or particles; flocci and spores black. Stem with the head about $\frac{1}{2}$ inch high.

347. **Didymium pusillum.** *B. & C.*—Stipite sursum attenuato luteo, peridio nutante globoso farinaceo, columella nulla, floccis albis parvis; sporis atropurpureis lævibus. Car. Inf. No. 1345. On dead herbaceous stems.

A minute species, about $\frac{1}{2}$ inch high. Stem attenuated upwards, yellow; peridium globose, nodding, farinaceous; columella none; flocci few, white; spores even, black-purple.

348. **Didymium chrysopeplum.** *B. & C.*—Stipite niveo leviter sulcato sursum attenuato e basi orbiculari oriundo; peridio globoso, exteriore furfuraceo fulvo, interiore metallico; floccis albis; sporis nigris. On dead leaves. Car. Inf. No. 1202.

Stem snow-white, springing from a little orbicular disc, slightly sulcate, attenuated upwards; head globose, slightly umbilicate, outer coat tawny, furfuraceous, inner metallic; flocci white, spores black.

349. **Didymium megalosporum.** *B. & C.*—Stipite gracili rufo; sursum attenuato; peridio umbilicato subhemispherico rufo albo-pulverulento; floccis parvis albis; sporis majoribus fuscis. On dead oak leaves. Car. Inf. No. 1205.

A minute species, about $\frac{1}{2}$ inch high; stem dark rufous, slender, attenuated upwards; peridium subhemispherical, umbilicate, rufous, with a white dusty bloom; flocci few, white; spores brown, large.

350. **Didymium obrussum.** *B. & C.*—Hypothallo tenuissimo scarioso; stipite aureo deorsum incrassato hyalino; peridio albo vel citrino, floccis candidis, sporis avlis. Linn. Soc. Journ., x., p. 348. On leaves of *Gonolobus*, Texas, Lindheimer. New Orleans, Drummond.

Stem golden-yellow, hyaline, attenuated upwards, springing from a very thin membranous hypothallus; peridium white or lemon-coloured; flocci white, spores black.

* **Didymium polymorphum.** *Mont.*—Cub. p. 314. *D. polycephalum*, Rav. On dead leaves. Car. Inf. No. 2587. Rav. No. 1673. New Jersey. No. 4701.

FRIES'S EPICRISIS.—A new and revised edition of this valuable work, by its venerable author, has already commenced, and we may hope soon to hear of its publication.

THE GENUS HYDRODICTYON.

By DR. HORATIO C. WOOD, JUN.*

The genus *Hydrodictyon* comprises, as far as known, but a single species, which is common to North America and Europe. It grows in great abundance in the neighbourhood of Philadelphia, especially in the ditches and stagnant brick ponds in the low grounds below the city, known as the "Neck." There it very frequently forms floating masses several inches in thickness, and many feet in extent, so that with the aid of a rake it could be gathered by the bushel. When thus in mass the colour is very generally dingy and yellowish, although the fronds, when in active vegetative life, are mostly of a bright, beautiful green. The plant is in greatest profusion in June and July, after which time it gradually disappears, until in the autumn it is scarcely to be found, but early in the spring it reappears. The very young fronds are minute, oval, cylindrical, filmy-looking closed nets, with the meshes not appreciable to the eye; when growth takes place the fronds enlarge, until finally they form beautiful cylindrical nets, two to six inches in length, with their meshes very distinct, and their ends closed. In the bright sunlight, they, of course, by virtue of the life functions of their chlorophyl, liberate oxygen, which, being free in the interior of the net, and its exit barred by the fine meshes, collects as a bubble in one end of the cylinder, and buoys it up, so that, the heavier end sinking, the net is suspended, as it were, vertically in the water. I know of few things of the kind more beautiful than a jar of limpid water, with masses of these little nets hanging from the surface like curtains of sheen in the bright sunlight. A few cells collected in the fall or early spring, if put into a preserving jar and the water occasionally changed, will multiply, and in a little while become a source of frequent pleasure to the watcher.

As the fronds increase in size they are always in some way or other broken up, so that, instead of being closed cylinders, they appear as simple open networks of less or greater extent. The extreme length to which the frond attains is, I think, very rarely over twelve inches, with meshes of about a third of an inch in length. The construction of the frond is always the same. It is composed of cylindrical cells united end to end in such a way as to form polygonal and mostly pentagonal meshes, the size of which varies with the age of the plant. These cells, which are closely conjoined, but have no passage-ways between them, are capable of independent life, so that the *Hydrodictyon* may be looked upon as an elaborate type of a cell-family, one in which cells are conjoined

* Extract from "A Contribution to the Natural History of the Fresh Water Algæ of North America." 1873.

in accordance with a definite plan, so as to make a body of definite shape and size, yet in which each cell is an independent being, drawing nothing from its neighbours. The cells themselves are cylindrical, with a thickish cellulose wall, and having no nuclei. Their chlorophyllous protoplasm is granular, and is placed in the exterior portion of the cell, forming thus, within the outer wall, a hollow cylinder, in which are imbedded starch granules, and whose interior is occupied with watery contents. The *Hydrodictyon* cell, when once formed, is capable of growth, but not of going through the usual process of cell multiplication by division, so that the adult frond is composed of just as many and, indeed, the same cells as it had in its earliest infancy.

No true sexual reproduction has as yet been discovered in the water-nets. There have been described, however, two forms or methods in which the species multiplies, both of them occurring by means of motile zoosporoid bodies. In the one case these develop immediately into the new plant, whilst in the other, before doing so, they pass through a resting stage. Of the life-history of the latter, the *microgonidia*, I have no personal knowledge.

The investigation of the production and development of the *macrogonidia*, however, has occupied considerable of the time devoted by myself to the microscope, and I have seen large numbers of specimens in almost all the stages of development. I have never been able to detect, however, any decided motion in the *macrogonidia*.

They are formed in the protoplasmic stratum already alluded to as occupying the outer portion of the interior of the *Hydrodictyon* cell. The first alteration in this, presaging their formation, is a disappearance of the starch granules, and a loss of the beautiful, transparent green colour. Shortly after this, even before all traces of the starch-grain are gone, there appear in the protoplasm numerous bright spots placed at regular intervals; these are the centres of development, around which the new bodies are to form. As the process goes on, the chlorophyll granules draw more and more closely around these points, and at the same time the mass becomes more and more opaque, dull, and yellowish brown in color. This condensation continues until at last the little masses are resolved into dark hexagonal or polygonal plates, distinctly separated by light, sharply defined lines. In some the original bright central spot is still perceptible, but in others it is entirely obscured by the dark chlorophyll. The separation of these plates now becomes more and more positive, and they begin to become convex, then lenticular, and are at last converted into free, oval, or globular bodies. When these are fully formed they are said to exhibit a peculiar trembling motion, mutually crowding and pushing one another, compared by Mr. Braun to the restless, uneasy movement seen in a dense crowd of people in which no one is able to leave his place. Whilst the process just described has been going on, the outer

cellulose wall of the *Hydrodictyon* cell has been undergoing changes, becoming thicker and softer and more and more capable of solution, and by the time the gonidia are formed it is enlarged and cracked, so that room is afforded them to separate a little distance from one another within the parent cell. Now the movements are said to become more active—a trembling jerking which has been compared to the ebullition of boiling water. There is, however, with this a very slight change of space, and in a very short time the gonidia arrange themselves so as to form a little net within the parent cell, a miniature in all important particulars of the adult *Hydrodictyon*. The primary cell wall now becomes more and more gelatinous, and soon undergoes complete solution, so that the new frond is set free in its native element. As previously stated in my investigations, I have never seen the peculiar motion above described, the newly-formed gonidia simply separating and arranging themselves without my being able to perceive any motion, or exactly how they fell into position.

It is evident that when the species is multiplied in the way just described the birth of the new frond is consentaneous with the death of the old cell. But when the *Hydrodictyon* disappear in the fall, it is months before they reappear in the spring. It is, therefore, evident there must be some other method of reproduction. This slow development of new fronds takes place, according to Pringsheim, by means of little motile bodies which he calls *Dauerschwarmer*, which has been translated in English *Chronisporos* (*statoisporos*, Hicks). M. Braun stated already some years since that, sometimes, instead of the *Hydrodictyon* producing the ordinary reproductive bodies (*macrogonidia*) there are formed in the cells much smaller and more active bodies, the *microgonidia*. The changes which occur in the production of these are very similar to those already described as happening when the *macrogonidia* are formed. When the *chronisporos* are once formed, however, they, instead of uniting together, escape in a free, distinct condition with the water. They are now small ovate bodies, with a large anterior transparent space, to which are attached a pair of cilia, and their life and history, according to Pringsheim, is as follows. For a few hours they move about very actively in the water, and then, dropping their cilia, and acquiring an outer cellulose wall, pass into a quiescent stage, in which they closely resemble *Protococcus* granules. They are capable of living in this state for a long time, if kept in water. They can also endure dessication if the light be excluded during the process, but, if it be present, they wither and die, and cannot be revived.

After a longer or shorter period, but never shorter than three months, according to Pringsheim, they recommence their life, provided they be in water. For four or five months after this the chief change consists simply in an increase in size. The dark green protoplasm is arranged around the exterior of the cell, within are the more fluid colourless contents; the whole body still looking

like a *Protococcus* cell. After a size of about $\frac{1}{40}$ th m.m. is attained, the endochrome divides successively into several portions. The external layers of the surrounding wall now give way in some spot, and allow the inner layers to protrude and form a sort of hernial sac, into which the several endochrome masses soon pass, at the same time assuming the well-known characters of true zoospores. From two to five of these bodies are thus produced out of each original microgonidium. They are large, ovate, biciliate, and, generally, soon escaping from the hernial sac, move about actively in the water for a few minutes. Sometimes, however, they settle down within the generative utricle. In either case, after a little time, they become motionless, lose their cilia, and develop into polyhedral cells, which are structurally remarkable for having their angles prolonged into long horn-like appendages. Under favourable circumstances, at the end of a few days, the bright green endochrome of these undergoes similar changes to those described as presaging the production of the microgonidia, and is finally formed into zoospores, which, in from twenty to forty minutes, unite, within the polyhedron or large cells, into a *Hydrodictyon*, which is finally set free by a solution of the cellulose coat of the polyhedron. The network thus formed differs in no essential way from that which arises in the better known way, except that it is composed of much fewer cells. It is generally a closed sac; but when the polyhedron, out of which it is developed, is small, it is sometimes merely an open network. Its after history appears to be identical with that of the ordinary *Hydrodictyon* frond.

See also Micrographic Dictionary, under *Hydrodictyon*—and Hassall's British Fresh Water Algæ, p. 225, plate lviii.

LABRELLA PTARMICÆ.

The following is the description of a parasite on *Achillæa ptarmica* gathered at Ealing, and sent for determination by G. D. Brown, as probably a species of *Phacidium*, which, externally, it greatly resembles:—

Labrella Ptarmicæ. Desm. Pl. Crypt No. 189. Fries Elen. ii. 149. *Schizothyrium Ptarmicæ*, Desm. Ann. des Sci. Nat. xi. (1849), p. 560. Kickx. Crypt. Flor. Fland. i., p. 467.

Innate, black, somewhat shining, rounded or ovate; asci cylindrical or subclavate; sporidia minute, ovoid.

On leaves and stems of *Achillæa Ptarmica*.

The Rev. M. J. Berkeley observed this many years since on infected plants of *Achillæa* which he brought home from France, and cultivated in England; but it was not included in the British Flora, as the fungus was manifestly brought over with its host. This may also be the case in the present instance. *Schizothyrium* is perhaps the most accurate determination, but the fungus is better known as *Labrella*. The former genus is classed with the *Phacidiceæ*.

SPHÆRIACEI BRITANNICI.

"A Fasciculus of one hundred British Sphærias, collected, named, and mounted by CHARLES B. PLOWRIGHT, King's Lynn, 1873," contains the following species:—

- 1 *Torrubia ophioglossoides*. *Tul.* Castle Rising.
- 2 *Epichlœ typhina*. *Berk.* "
- 3 *Hypocrea gelatinosa*. *Fr.* "
- 4 *Hypomyces aurantius*. *Tul.* Dunoon, Scotland.
- 5 *Hypomyces lateritius*. *Tul.* Hereford.
- 6 *Nectria pulicaris*. *Tul.* King's Lynn.
- 7 *Nectria cinnabarina* *Fr.* "
- 8 *Nectria coccinea*. *Fr.* Dunoon, Scotland.
- 9 *Nectria sinopica*. *Fr.* Shrewsbury.
- 10 *Nectria inaurata*. *B. & Br.* King's Lynn.
- 11 *Nectria episphæria* *Fr.* "
- 12 *Xylaria polymorpha*. *Grev.* "
- 13 *Xylaria hypoxylon*. *Grev.* "
- 14 *Xylaria carpophila*. *Fr.* "
- 15 *Ustulina vulgaris*. *Tul.* Haughmon Hill, Shrewsbury.
- 16 *Hypoxylon luteum*. *Fr.* Castle Rising.
- 17 *Hypoxylon concentricum*. *Grev.* Castle Rising.
- 18 *Hypoxylon multiforme*. *Fr.* Dunoon, Scotland.
- 19 *Hypoxylon argillaceum*. *Fr.* King's Lynn.
- 20 *Hypoxylon fuscum*. *Fr.* "
- 21 *Hypoxylon rubiginosum*. *Fr.* (?) "
- 22 *Eutypa Acharii*. *Tul.* "
- 23 *Eutypa flavo-virens*. *Fr.* "
- 24 *Melogramma gastrinum*. *Tul.* "
- 25 *Dothidea ulmi*. *Fr.* "
- 26 *Dothidea junci*. *Fckl.* Dunoon, Scotland.
- 27 *Dothidea graminis*. *Fr.* King's Lynn.
- 28 *Dothidea ribesia*. *Pers.* "
- 29 *Dothidea rosæ*. *Fr.* "
- 30 *Dothidea filicina*. *Fr.* "
- 31 *Diatrype quercina*. *Tul.* "
- 32 *Diatrype stigma*. *Fr.* "
- 33 *Diatrype disciformis*. *Fr.* "
- 34 *Diatrype bullata*. *Fr.* "
- 35 *Diatrype pyrrhocystis*. *B. & Br.* "
- 36 *Diatrype strumella*. *Fr.* "
- 37 *Diatrype nucleata*. *Curr.* "
- 38 *Diatrype ferruginea*. *Fr.* "
- 39 *Diatrype frangulæ*. *Pers.?* "
- 40 *Melanconis stilbostoma*. *Tul.* "
- 41 *Valsa prunastri*. *Fr.* "
- 42 *Valsa stellulata*. *Fr.* "
- 43 *Valsa syngenesia*. *Fr.* "
- 44 *Valsa dissepta*. *Fr.* "

- 45 *Valsa ceratophora.* Tul. King's Lynn.
- 46 *Valsa ambiens.* Fr. "
- 47 *Valsa salicina.* Fr. "
- 48 *Valsa pulchella.* Fr. Ringstead Downs.
- 49 *Valsa quaternata.* Fr. "
- 50 *Valsa leiphemia.* Fr. "
- 51 *Valsa tiliaë.* Tul. "
- 52 *Valsa detrusa.* Fr. Shrewsbury.
- 53 *Cucurbitaria laburni.* De Not. King's Lynn.
- 54 *Cucurbitaria elongata.* var. simplex. Grev. King's Lynn.
- 55 *Cucurbitaria spartii.* De Not. "
- 56 *Cucurbitaria berberidis.* Grev. Shrewsbury.
- 57 *Cucurbitaria cupularis.* Fr. King's Lynn.
- 58 *Gibbera Saubinetii.* Mont. "
- 59 *Massaria bufonia.* Tul. "
- 60 *Lophiostoma arundinis.* De Not. "
- 61 *Sphæria aquila.* Fr. "
- 62 *Sphæria phæostroma.* Mont. "
- 63 *Sphæria tristis.* Tode. "
- 64 *Sphæria brassicæ.* Klotzsch. Wellington, Shropshire.
- 65 *Sphæria canescens.* Pers. King's Lynn.
- 66 *Sphæria spermoides.* Hoffm. "
- 67 *Sphæria moriformis.* Tode. Ringstead Downs.
- 68 *Sphæria pomiformis.* Pers. "
- 69 *Sphæria pulviscula.* Curr. King's Lynn.
- 70 *Sphæria mammæformis.* Pers. "
- 71 *Sphæria obducens.* Fr. "
- 72 *Sphæria pulvis-pyrius.* Pers. "
- 73 *Sphæria sporormia.* Cooke. "
- 74 *Sphæria stercoraria.* Sow. "
- 75 *Sphæria pulveracea.* Ehr. "
- 76 *Sphæria myriocarpa.* Fr. "
- 77 *Sphæria loniceræ.* Sow. "
- 78 *Sphæria crinigera.* Cooke. Dunoon, Scotland.
- 79 *Sphæria melanotes.* B. & Br. King's Lynn.
- 80 *Sphæria apiculata.* Curr. "
- 81 *Sphæria spiculosa.* Pers. "
- 82 *Sphæria inquilina.* Fr. "
- 83 *Sphæria millepunctata.* Grev. "
- 84 *Sphæria quadrinucleata.* Curr. Ringstead Downs.
- 85 *Sphæria clypeata.* Nees. "
- 86 *Sphæria herbarum.* Pers. King's Lynn.
- 87 *Sphæria herbarum.* Pers. var. *Scrophulariæ.* Shrewsbury.
- 88 *Sphæria acuminata.* Sow. King's Lynn.
- 89 *Sphæria acuta.* Moug. "
- 90 *Sphæria derasa.* B. & Br. "
- 91 *Sphæria sabuletorum.* B. & Br. Wolferton Beach.
- 92 *Sphæria pinodes.* Blox. Shrewsbury.

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|-----|------------------------------|-------------------------------------|--------------|
| 93 | <i>Sphæria gnomon.</i> | - <i>Tode.</i> | King's Lynn. |
| 94 | <i>Sphæria setacea.</i> | <i>Pers.</i> var. <i>petiolæ.</i> | King's Lynn. |
| 95 | <i>Sphæria setacea.</i> | <i>Pers.</i> var. <i>epiphyllæ.</i> | „ |
| 96 | <i>Sphærella rusci.</i> | <i>De Not.</i> | „ |
| 97 | <i>Sphærella isariphora.</i> | <i>De Not.</i> | „ |
| 98 | <i>Stigmatea Robertiani.</i> | <i>Fr.</i> | „ |
| 99 | <i>Isothea pustula.</i> | <i>Berk.</i> | „ |
| 100 | <i>Dichæna strobilina.</i> | <i>Fr.</i> | „ |

TWO LICHENS FROM BEN LAWERS.

By DR. J. STIRTON.

The Annual Report and Transactions of the Glasgow Society of Field Naturalists, just published, contains a notice of two lichens from Ben Lawers, collected in June, 1871, which are new to the British Flora.

Solorina bispora, Nyl. (Syn. p. 331). The spores in size and shape are characteristic, as well as the peculiar granular or isidiose appearance of the thallus in the neighbourhood of the apothecia. This lichen is more allied to *S. limbata* than to *S. saccata*. This is the first intimation of its existence in any other locality than that on the Pyrenees.

Lecidea didymospora, Stirton. Nearly allied to *L. sanguinaria*, but differing in having two spores in each ascus, which are, besides, only half the size of those of the latter, and oval in shape instead of oblong. A section of the apothecium shows, also, a perfectly pellucid appearance, instead of the greenish tinge which pervades the hymenium of *L. sanguinaria*, and the thallus is more continuous. The chemical reactions of the hymenium, epispore, and thallus are identical in both. The discoverer remarked, besides, that this lichen is as much entitled to a specific place as *Lecidea geminata*.

Callithamnion hormocarpum. Holmes.—Dr. J. E. Gray writes us that in his opinion this is identical with *Callithamnion versicolor*, an identity which Mr. Holmes is not yet convinced of, as far as his experience of the latter plant extends.

THE FUNGUS MEETING of the Royal Horticultural Society at South Kensington, is fixed for the 1st of October, and the Fungus Foray of the Woolhope Club is finally appointed for Thursday, October 23rd, at Hereford. This latter is a correction of the date which appeared in our last number.

SPHAGNUM AUSTINI.

In May, 1873, Dr. Braithwaite gave excellent figures, with a description of this *Sphagnum*, in the "Monthly Microscopical Journal," concluding with the observation, "I am indebted to Prof. Lindberg for specimens of this fine *Sphagnum*, which we may reasonably hope will some day be found in Scotland."

In the "Journal of Botany" for September appears a letter from Dr. D. Moore to the following effect:—"I enclose specimens of *Sphagnum Austini*, Sullivant, which Dr. Lindberg recognised among a collection of Mosses which I made in the Island of Lewis in 1868. I had supposed the plant to be a remarkable variety of *S. cymbifolium*, differing so widely from the typical form of the species as to warrant me in making a diagnosis of its characters. It is geographically interesting to find a species not rare in North America inhabiting the Western Isles of Scotland. It grew on extensive flat boggy moors, and forms large hummocks sometimes 18 inches to two feet above the surrounding level.

The following is Dr. Braithwaite's description:—

Sphagnum Austini, Sullivant, in Austin's Musci Appalachiani. Ic. Musc. Supp. i. ined., No. 2, Lindberg Contrib. ad Fl. Crypt. Asiæ. Bor. Or., p. 280 (1872).

Dioicous; much resembling *Sph. papillosum* and the American *Sph. Portoricense*, more or less ochraceous. Stems frequently dichotomous, dark-brown, the bark composed of four strata of cells, the outer quadrato-hexagonal, without fibres, the inner with very fine fibres and large pores.

Branches closely placed 3 in a fascicle, 2 divergent, attenuated at points, 1 pendent, short, slender, appressed to stem; cortical cells with fine spiral fibres. Cauline leaves, lingulate, obtuse, minutely fringed at apex, the areolation as in *Sph. cymbifolium*. Ramuline leaves, closely imbricated, ovate-oblong, concave, more deeply coloured at apex, which is also less encuculate, but with cells strongly projecting on the back; cells large, the hyaline filled with fibres, and having several large foramina. The chlorophyllose obtusely trigonous, projecting between the hyaline on the concave surface of the leaf. The internal wall of the hyaline cells, where united to the chlorophyllose, densely crested with prominent papillæ.

Fruit but little exerted; peduncular bracts oblong, convolute, minutely fimbriate at the rounded apex, cells of the lower third, empty, narrow, parenchymatous, above normal, more or less fibrous, with large pores. The adjacent walls transversely striate by the large papillæ. Spores ferruginous.

Hab. swamps. United States. Sweden.

Anthoceros lævis.—During a visit in July to the south-west of Ireland, with Dr. Lindberg, we found this rare species, not before known to grow in Ireland, in one place only near Ventry, co. Kerry.—D. Moore, in *Journ. Bot.*

CLASSIFICATION OF THE SPHÆRIACEI.

BY THE EDITOR.

The observations of Mr. C. B. Plowright in the last number of "Grevillea," will be interesting and useful to many of our readers, and demand but little comment. It must be expected that different workers will have different views concerning those somewhat elastic terms "Genera" and "Species." Far be it from us to assume dogmatically in this instance, and in others of a similar character, that we are right, and those who differ from us are wrong. Still, there is an observation or two which we would offer on the principles of classification generally, and on this classification of the Sphæriacei in particular that may be worthy of consideration. In the first place, is it true that because a genus, like that of *Sphæria*, is so large, it becomes a duty to lessen it, by splitting it up into smaller genera? That would seem to be the inference to be drawn from the paragraph on page 46. It seems to us that however inconvenient a large genus may be, some better grounds must be sought for its "modification." Before any attempt is made at the "modification" of a genus, we apprehend that it would be beneficial to have one or two recognized principles upon which to proceed, and, in the classification of the genus *Sphæria* under new groups, having the value of genera, there seems to be one important feature which should be kept in mind. The form and segmentation of sporidia *alone* may be of specific, but cannot at the same time be of generic value. Want of attention to this which we hold to be a cardinal doctrine has given us a host of names for proposed genera of *Sphæriacei* which serve more to encumber and mystify a difficult subject than any other purpose. It may be useful to recognize groups of species having similar sporidia, as in *Raphidospora*, and call those groups by any convenient or characteristic name, so long as they are recognized at their proper, and not invested with a fictitious value. We make these remarks less in opposition to our good friend Mr. Plowright than in extenuation of our own sins in not adopting in the "Handbook" a larger number of continental genera. We cannot accept the majority of genera in *Sphæria* and *Peziza* adopted by Fuckel and others, because they are established on insufficient characters, derived solely from the sporidia. Perhaps the genus *Gnomonia*, including such rostellate species as *Sphæria gnomon*, claims recognition, but with that exception we do not yet see any good reason to amend the classification we have adopted. The division of *Sphæriacei* into *Vegetabilicoli* and *Fimicoli*, is, we fear, a very weak point in Fuckel's classification.

TWO NEW BRITISH AGARICS.

Described by PROFESSOR ELIAS FRIES.

Agaricus Worthingtoni. *Fr.*—Pileus slightly fleshy, campanulate, then convex, viscid (?), even, golden yellow; stem fistulose, slender, sub-flexuose, turquoise blue; gills adnate, ferruginous brown. *Fries in Journ. Bot.* (1873), p. 204. A. (*Stropharia*) *albo-cyaneus*, *Saund. & Sm. Myc. Ill.*, t. 29, f. 1-5 (not Desm.)

Pastures. Walthamstow. Dec.

Differing from *Ag. albo-cyaneus*, in which the stem is soft, hollow, 3-4 lines thick, and shorter; pileus fleshy, convex, then plane, milky-white, then becoming verdigris-green; gills whitish, then brownish. Spores $\cdot 00027 \times \cdot 00017$ in.

Agaricus Saundersii. *Fr.*—Pileus fleshy, thin about the margin, convex, smooth, viscid (?), becoming whitish; stem solid, firm, equal, smooth, white; gills slightly adnexed, broad, distant, flesh-coloured. *Fries in Journ. Bot.* (1873), p. 205. A. (*Entoloma*) *majalis*, *Saund. & Sm. Myc. Illus. t.* 46 (not Fries).

Growing on the ground in patches.

Ag. majalis, *Fr.*, differs from this, especially in the slender stature, fistulose stem, membranaceous pileus, which is campanulate on opening, and cinnamon, and in the gills being free, crowded, and crenate.

LEIGHTON'S LICHEN-FLORA OF GREAT BRITAIN,
&c.

Being desirous to keep my folio interleaved copy of this work duly posted up with the new species, varieties, and localities continually added to our British Lichens, with a view eventually to a more perfect and comprehensive third edition, or at all events a supplement to the work, I shall feel greatly indebted to lichenists generally if they will obligingly communicate to me, either by loan or gift, characteristic and authentic specimens of any new finds, and any other new information relative to our Lichenology. It is only by this mutual co-operation that anything approaching completeness or perfection can be obtained, and it is confidently hoped that there will be no reluctance, but rather a willing readiness, among my fellow lichenists, to aid and assist with the characteristic liberality of all real scientific students, in every possible way at their command towards this desirable consummation. Any specimens entrusted to me for examination will invariably be carefully and speedily returned to the owners, and I shall myself at all times be most willing in return to supply their desiderata, so far as my duplicates enable me to do so.

Address Rev. W. A. Leighton, Luciefelde, Shrewsbury.

W. A. LEIGHTON.

Aug. 25, 1873.

Spilocæa pomi. *Fries.*—This fungus has made its appearance this autumn in what would seem to be stronger force than heretofore, threatening some crops with destruction. It appears at first beneath the cuticle of the fruit, then breaks through in circular, often confluent, patches, of a dark brown colour, bordered by the lacerated margin of the cuticle. The microscope reveals a mass of short septate threads, which are simple, and closely packed together, each one terminating in an ovate, caducous joint, which has all the characters of a spore, and ultimately becomes at least uniseptate. The threads and spores are slightly coloured of a smoky-grey tint. From these particulars it will be seen how near *Spilocæa pomi* approaches to such species of *Cladosporium* as *C. dendriticum*, of which it is probably only a condition. In the "Gardener's Chronicle" for Sept. 20th, it is supposed to be a state of *Helminthosporium pyrorum*. At any rate, mycologists seem to be agreed that it is not an autonomous plant, and is closely related either to *Cladosporium* or *Helminthosporium*. From our own examination, we are at present more disposed to refer it to the former than to the latter. Further investigation, at a later period, might, perhaps, modify this opinion, but at present its characters seem to approximate so closely to *Cladosporium dendriticum*, especially the variety *orbiculatum*, that we consider the probabilities strongly in favour of that species.—ED. GREVILLEA.

CRYPTOGAMIC LITERATURE.

WOOD, DR. HORATIO.—A contribution to the Fresh Water Algæ of North America, with plates. ("Smithsonian Contributions to Knowledge.")

LANGENBACH, DR. GUSTAV.—Die Meeresalgen der Inseln Sizilien und Pantellaria. Berlin.

MOORE, DR. DAVID.—Synopsis of all the Mosses known to inhabit Ireland, up to the present time, from the "Proceedings of the Royal Irish Academy," vol. 1, ser. 2.

FLOWRIGHT, C. B.—A list of the Fungi known to occur in the county of Norfolk, and

BEVERLEY, DR. MICHAEL.—On the Edible Fungi found in Norfolk, in the "Transactions of the Norfolk and Norwich Naturalists' Society for 1872-3."

Lists of the Local Fauna and Flora of Eastbourne, reprinted from "Chambers's Handbook for Eastbourne," corrected to June, 1873.

LINDSAY, DR. LAUDER.—General Index to Memoirs of the Spermogones and Pycnides of Lichens.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By the REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 53.)

* **Didymium luteo-griseum.** *B. & C.*—Pennsylvania, Michener, is apparently the same species.

351. **Didymium Curtisii.** *B.*—Sessile, obovatum fuscum, sparsum vel lateraliter congestum glabrum, columella distincta; floccis albis, sporis nigris. On dead leaves, grass, &c. *Car. Inf.*, No. 1179-1589.

Sessile, obovate, brown, scattered or laterally connate, columella distinct, apparently of a loose texture; flocci white; spores black.

352. **Didymium lateritium.** *B. & R.*—Globosum vel subreticulatum, ex hypothallo membranaceo repente oriundum, lateritium granulatum, floccis albis, sporis atris. On dead leaves, &c. *Car. Inf. Rav.* No. 1015.

Globose or somewhat reticulated by confluence, attached to a membranous creeping hypothallus, which has some resemblance to that of *Physarum connatum*; brick-red; minutely granulated; flocci white; spores black.

353. **Didymium Nectriæforme.** *B. & C.*—Sessile, fasciculatum obovatum; fuscum pulvere luteo sparsum; sporis nigris. On dead leaves. New England, Murray, No. 5701.

Sessile, fasciculate, obovate; springing from a yellow cellular hypothallus, somewhat resembling that of the last species; brown, with a yellow pulverulent bloom; spores black.

* **Physarum psittacinum.** *Dittm.*—On damp, putrid logs. *Car. Inf. Ravenel.* No. 742.

354. **Physarum pulcherrimum.** *B. & R.*—Stipite brevi purpureo; peridio globoso floccisque lilacinis. On dead pine wood, &c. *Car. Inf. Ravenel*, No. 744. Pennsylvania, Michener.

Stem short, but varying in thickness; dark purple; peridium globose, lilac, together with the abundant flocci. Two forms occur, one of which is smaller and more graceful.

355. **Physarum cupripes.** *B. & R.*—Primum luteo-viride mucosum; stipite sursum attenuato penetrante cupreo; peridio globoso lilaciseo-cæuleo, floccis luteis, sporis atris. On dead wood.

At first forming a yellowish green mucus, which spreads over the surface in patches ; 12-18 inches across, interlaced with veins, from which spring the coffee-coloured attenuated stems which penetrate the globose lilac-blue peridia ; flocci abundant ; yellowish ; spores black. *Physarum roseum*, *B. & Br.*, is much brighter in colour, but nearly allied.

* ***Physarum Columbinum*.** *Fr.*—On dead wood. Michener. No. 3817.

356. ***Physarum Petersii*.** *B. & C.*—Stipite æquali lateritio, peridio globoso luteo ; floccis subflavis ; sporis atris. On dead wood. Alabama, Peters. No. 6072.

Stem equal, brick-red ; head globose, delicate yellow when free from the dark spores ; flocci yellowish.

357. ***Physarum chrysotrichum*.** *B. & C.*—Sessile, subglobosum, peridio floccisque fulvis. On dead wood. Alabama, Peters. No. 5091.

Sessile, globose ; somewhat depressed ; tawny ; the upper part soon breaking off ; flocci springing from the base, tawny like the peridium.

358. ***Physarum Schweinitzii*.** *B.*—Gregarium nitidum flavum, floccis parvis sporisque globosis granulatis concoloribus. Polyanthium vitellinum, *Schwein.* On vegetable fragments. Bethlehem Schweinitz.

Gregarious, minute, shining, yellow, globose, sessile ; flocci few even and globose granulated, spores 0006 in diameter, sometimes rather irregular.

* ***Physarum connatum*.** *Dittm.*—*Didymium polycephalum*. *B. & C.*—On dead leaves. *Car. Inf.* No. 2589.

359. ***Badhamia papaveracea*.** *B. & Rav.*—Peridiis globosis brevissime stipitatis ut plurimum congestis albis rugosis ; floccis reticulatis niveis ; sporis atris. On decayed oak wood. Aiken. *Car. Inf. Rav.* No. 1768.

Peridia globose, very shortly stipitate, scattered, or more generally crowded ; white, wrinkled, so at first to look like a *Didymium* ; flocci white, reticulated ; spores 0004 in diameter, somewhat obovate, granulated above, about seven in a group.

* ***Badhamia utricularis*.** *B. & Br.*—*Physarum utriculare*. *Fr.*

Penns., Michener. No. 4408. No. 3553, on cherry, from the same locality, is apparently a very distinct species, with a yellow peridium ; but the specimens are too imperfect to characterise.

* ***Badhamia decipiens*.** *B.*—*Car. Inf.*, No. 1333.

360. ***Trichamphora oblonga*.** *B. & C.*—Stipite lateritio compresso sursum attenuato flexuoso ; peridio oblongo apice denum hyante umbrino particulis nitentibus conspereo. On dead wood. Penns., Michener. No. 3578.

About $\frac{1}{2}$ of an inch high ; stem compressed, flexuous, brick-red ;

peridium oblong, sub-cylindrical, umber, sprinkled with shining orbicular particles, opening with a little orifice; spores minute. A very curious plant, of which I have but few individuals. The margin of the spores is not marked with transverse lines as in *T. pezizoides*, Jungh.

361. **Craterium minimum.** *B. & C.*—Pedunculo brevissimo, peridio cyathiformi minimo, basi rufo, margine albo. On dead grass, &c. Car. Inf., No. 2991.

Extremely minute; stem very short; peridium cyathiform; rufous below; margin white. *C. floriforme*, Schwein, is a *Trichia*.

* **C. globosum.** *Fr.*—Car. Inf. No. 3841.

* **Dictydium microcarpon.** *Schrad.*—Car. Sup. No. 60.

* **Dictydium umbilicatum.** *Schrad.*—Var. *laxum*; reticulo laxiore, sporis pallidioribus majoribus. On planks. Car. Inf., No. 1150.

Differs from the normal form in the looser network and paler larger spores.

362. **Cribraria elegans.** *B. & C.*—Stipite sursum attenuato fusco; peridio globoso, purpureo basi leviter venoso; capillitio reticulato angulis incrassatis sporisque concoloribus. On decayed wood. Car. Inf., No. 2992.

About $\frac{1}{2}$ of an inch high; stem much attenuated above; peridium nodding; slightly venose at the persistent base, purple; capillitium reticulated; the angles of the network incrassated, purple as well as the spores.

363. **Cribraria minima.** *B. & C.*—Stipite filiformi peridio globoso nutante umbrino subtiliter striato; capillitio laxo pallido ad angulos dilitato. On pine planks. No. 2717.

364. **Cribraria microscopica.** *B. & C.*—Stipite brevi peridio obovato basi evenoso capillitio laxo, angulis non incrassatis. On shingles. Car. Inf., No. 1182.

Very minute, .012 high; stem short, straight; peridium obovate, not venose below; capillitium loose, not incrassated at the angles.

* **Cribraria intricata.** *Schrad.*—On dead wood. Car. Inf., No. 1121, 1122, 1270, 1530.

* **Arcyria cinerea.** *P.*—Texas, Lindheimer. No. 3631, Car. Inf. Rav. No. 415, 1342, 1752. Ohio, Lea. No. 199. New Jersey. No. 4704.

* **Arcyria umbrina.** *Schum.*—Car. Inf. No. 1434.

365. **Arcyria pallida.** *B. & C.*—Stipite sulcato; peridio oblongo capillitioque pallidis. On bark. Car. Inf., No. 2236.

Stems short, sulcate, fasciculate; peridium oblong, pale, as well as the smooth not echinulate threads. Much smaller than any state of *A. flava*.

* **Licea applanata.** *B.*—On bark of *Quercus Alba*. Alabama, Peters. No. 6081. Rav. No. 1348.

* **Licea fragiformis.** *Nees.*—Pennsylvania, Michener. No. 6043. Car. Inf., No. 1140.

* **Licea cylindrica.** *Fr.*—Car. Sup., No. 802. Mountains of New York. No. 4415.

366. **Licea stipitata.** *B. & R.*—Stipite communi crasso sulcato; peridiis in caput hemisphaericum conglomeratis; sporis laete umbrinis cymbiformibus. Linn. Soc. Journ. x., p. 350. On dead wood. Car. Inf. Rav., No. 1305.

Common stem, thick, sulcate; peridia collected into an hemispherical mass; spores pinkish umber, boat-shaped.

367. **Licea microsperma.** *B. & C.*—Conglomerata laete umbrina, sporis cymbiformibus minoribus. New Jersey. No. 4695.

Closely resembling *L. fragiformis*, but the spores in that species are globose and minutely echinulate, and .00028 inch in diameter, while in the present they are shaped as in *Licea stipitata*, .0002.

368. **Licea spermoides.** *B. & C.*—Effusa gregaria tenuis olivacea albo-pulverulenta sporis olivaceis. Alabama, Beaumont. No. 4867.

Spreading widely, thin, olivaceous, clothed with white meal; spores olive. .0002 in diameter. A very distinct species.

369. **Licea Lindheimeri.** *B.*—Effusa, extus nigra, intus rhabarbarina, sublateritia, sporis globosis. On dead bark. Texas, Lindheimer. No. 3640.

Effused, black, of a tawny brick-red within; spores globose, .0003 in diam.

* **Lachnobolus cribrosus.** *Fr.*—Car. Inf., No. 419.

* **Perichæna quercina.** *Fr.*—No. 6508. Howr.

370. **Perichæna artocreas.** *B. & R.*—Deplanata circumscissa subfulva; sporis concoloribus fusiformibus. On bark of juniper. Car. Inf., No. 1459.

Flat, of a tawny yellow, distinctly circumcised at the base; spores fusiform, .0005 long. Very like *P. populina*, but the spores very different.

371. **Perichæna irregularis.** *B. & C.*—Peridiis congestis irregularibus, floccis granulatis, sporis e globosis late ellipticis. On bark. Car. Inf. No. 2478.

Crowded, irregular, angular; flocci bright yellow, minutely granulated; spores globose, then broadly elliptic. This species comes very near to *P. populina*, but appears to be really distinct.

372. **Ophiotheca umbrina.** *B. & C.*—Peridiis umbrinis serpentinis, floccis crenatis pallidis, sporis globosis. On stems of herbaceous plants. Car. Sup. No. 413.

Peridia creeping, flexuous, umber, flocci pale yellow, crenate; spores globose, .0004 in. diameter.

* *Diachea elegans*. Fr.—Car. Inf. No. 1157. *D. leucostyla*, Schwein. is the same.

* *Enerthenema elegans*. Bowman.—On boards of a shed. Car. Inf. No. 1301.

373. *Stemonitis tenerrima*. B. & C.—Stipite filiformi, peridio toto percurso cylindrico fusco; capillitio pallido tenerrimo; sporis carneis. On herbaceous stems. Car. Inf. No. 1343.

Stem filiform, penetrating to the apex: peridium cylindrical, brown; capillitium very delicate, pallid; spores flesh-coloured. A small, delicate species.

* *Stemonitis ovata*. P.—Car. Inf. No. 1300.

* *Stemonitis oblonga*. Fr.—Car. Sup., Curtis. No. 244.

* *Stemonitis obtusata*. Fr.—Alabama, Peters. No. 6067.

* *Stemonitis physaroides*.—A. & S.—Ohio. No. 196. Var. *subænea*.

* *Stemonitis pulchella*. Bab. — Car. Inf. No. 2041. On grass.

374. *Stemonitis porphyra*. B. & C.—Stipite gracili nigro; peridio globoso columbino; capillitio porphyro. On pine wood.

Stem slender, black, shining; peridium globose, shining like a pigeon's breast; capillitium purple.

375. *Phoma longipes*. B. & C.—Subcorticale, gregarium; sporophoris multoties sporis minutis breviter oblongis longioribus. On *Morus rubra*. Car. Inf. No. 2101.

Produced under the bark, in which it makes little pustules, at length more or less free, sporophores many times longer than the short, oblong, minute spores. Apparently the same species occurs on tender shoots of *Juniperus Virginica*. Car. Sup., No. 6468, but the perithecia are more scattered.

THE NATURAL HISTORY OF THE BRITISH DIATOMACEÆ.—(PARTS 1, 2, 3.)—BY A. S. DONKIN, M.D. LONDON—*Van Voorst*. 1873.

Perhaps no branch of natural history, particularly that relating to the lower organisms, has occupied the attention of the microscopist more than the Diatomaceæ.

The synopsis of British Diatomaceæ, by Professor Smith, was first, and indeed the only English work in which any scientific arrangement was attempted, and since its publication (20 years ago) very many new species have, from time to time, been published in various periodicals; a new edition of Smith's work, or a new synopsis, therefore became highly desirable. Dr. Donkin has chosen the latter alternative, and adopts an arrangement of his own. He proposes to divide the work into two portions, viz., the Introduction, which will contain the natural history, classification, structure,

mode of development, and method of collecting. The second division, or synoptical portion, will give an accurate and succinct description of all known British genera and species with their synonyms.

The synoptical portion is to be completed first. The first part commences with the Naviculeæ, which, the author says "are by far the most numerous family of the Diatomaceæ, of which they are typical, both in the structure of the frustule and the peculiar power of motion they display. . . . Two distinct and well marked types of form or development are met with amongst the Naviculeæ; in the first the valve is depressed or flattened, broad or short (in proportion to its width), the convexity being slight and confined to near the margin. In the second the valve is elevated or convex and narrow (in proportion to its length), the convexity being great and extending from the margin to the medium line, where it is most prominent.

"In reconstructing this genus and rearranging its numerous species I have adopted these two types as the basis of classification."

The author follows Kützinger and other diatomists in combining *Navicula* and *Pinnularia*, and he also refers several species of *Stauroneis* to the genus *Navicula*, and he is probably right in so doing.

He retains Professor Smith's term "side view" (S.V.), but abolishes "front view" (F.V.), and substitutes M.V., signifying the view of the frustule exhibiting the *median connecting zone and the margin of the valves*. This change appears to us to be unnecessary, as the former term was sufficiently intelligible, and has been in use for many years; if any alteration were desirable on account of simplicity, the letters F and V would be all that are required, the former signifying the frustular, and the latter the valvular view.

In the Synopsis of British Diatomaceæ, 83 species of *Navicula* and *Pinnularia* are described, 60 of which are figured. In the first three parts of the present work 104 species are figured and described, and probably one or two more parts will be required to complete the genus.

We regret to say that the plates are of very unequal merit—those in Part 2 are particularly unsatisfactory—for example *N. cuspidata* is represented with much coarser striæ than *N. fulva*, although the former is said to have 36, and the latter only 30 striæ in .001. *N. serians* is unrecognisable, the wavy longitudinal striæ, its most characteristic feature, not being shown. (The Author says these longitudinal markings are "plicæ or folds on the valve;" this, however, is not the case. The peculiar appearance of the longitudinal striæ are caused by the granules of which the transverse striæ are composed being placed at irregular intervals, so that the granules in one line of striæ are not opposite those above and below it.) A similar arrangement occurs in the large *N. rhom-*

boides (sporangial form of Dr. Lewis). The curious decussating striæ of *N. rostellum* (in fact, no kind of striæ are figured) are not shown. In the description they are stated to be indistinct, 80 in $\cdot 001$; under a power of 500 diameters they are easily resolved, and are certainly not more than 55 or 60 in $\cdot 001$.*

Having thus alluded to the defects in the plates, we proceed to the more agreeable task of calling attention to their merits; excepting those just named, and two or three others, they are far more correct than those in the Synopsis. We would particularly draw attention to the following forms:—*N. hebes* = *N. obtusa*, Sm. *N. rostrata* = *N. tumens*, Sm. (the figure in the Synopsis is totally unlike the actual form). *N. alpina*, *N. latiuscula* = *N. patula*, Sm., *N. nobilis* and *N. major* are all admirably represented. In concluding these brief and imperfect remarks on Dr. Donkin's undertaking, we beg to express our best wishes for its success, and hope the publication of the parts will now proceed uninterruptedly.

F. KITTON, Norwich.

* We happen to know that the principal cause of the delay in the publication of the parts has been owing to the difficulty of obtaining satisfactory drawings.

ADDITIONS TO THE LICHEN FLORA OF GREAT BRITAIN.

By DR. J. STIRTON.

1. **Pyrenopsis hæmalea.** *Smrf.*—Ben Lawers, July, 1871.

2. **Lecidea botryiza.** *Nyl. Sp. nova.*—Thallus cinereo-virescent, squamuloso-pulverulent, thin (K—C—). Apothecia small, simple or aggregate, prominent, almost spherical, pale-brown to dark-brown; spores 8, colourless, elliptical, simple ($\cdot 008 \times \cdot 004$ m.m.); hymenium colourless, pellucid; paraphyses not discrete, apices colourless; hypothecium thick, dense, brownish-black; gelatina hymenea cærulescent then vinous-red with iodine. Ben Voirlich, 1871.

3. **Lecidea Brayeriana, f. ochrodes.** *Nyl.*—Glen Callater, 1872.

4. **Lecidea cupreiformis, var. lecanodes.** *Nyl.*—Apothecia spuria lecanoroidea. Ben Lawers, 1871.

5. **Lecidea subincompta, f. oribata.** *Nyl.*—Ben Lawers, 1871.

6. **Lecidea persimilis.** *Nyl.*—Lich. Scand., p. 236.

Thallus whitish, visible here and there, granular; apothecia at first small and very concave, afterwards flat and expanded as well as enlarged. I am inclined to refer *Lecidea scapanaria* (Carrington) to this Lichen.

Ben Lawers, 1871. Carlochán, 1873. On *Jungermannia*.

ON THE DESMIDIACEÆ—By DR. HORATIO C. WOOD, JUN.*

Of all the fresh water Algæ, with the exception of the diatoms, this family has attracted most attention, owing, not only to the beauty and variety of its forms, but also to their universal presence and abundance, and the ease with which their most wonderful life-histories are observed. They are exclusively, as far as known, denizens of fresh water, and preferably that which is pure and limpid. Although Mr. Ralfs states that they never grow in stagnant water, I have often found them in great abundance in such, yet never in that which was actually putrid. The same authority is also too sweeping, at least as far as this country is concerned, in stating they are never found in woods, although they are really most abundant in the open country. My experience has taught me to look for them in brick-ponds, small mountain lakes, springy fens, ditches, and, in the fall, growing among mosses and in the thick jelly composed of unicellular algæ on the face of dripping rocks; or to sum up in a word, they dwell in quiet shallow waters, for I have never found them in rapidly moving or very deep water.

The single cell of which a Desmid is composed is mostly divided into two very marked similar portions, the exact counterparts one of the other, which by some have been asserted to be distinct cells. Their close union and connection, and their inherent oneness are, however, so apparent that it is needless here to spend time in demonstrating that they really are halves of one individual cell. They contain together all the parts found in the typical vegetable cell; an outer cellulose wall, chlorophyllous protoplasm, a nucleus, starch granules and semi-liquid contents. The cell wall, or cytiderm, as it is called in this memoir, varies in thickness and firmness. During life it is mostly, if not always, colourless; but in certain species in the dead empty frond is of a reddish yellow. The markings upon it are various, and are not unfrequently altogether absent; they are such as fine or coarse punctations, granulations of various size, striæ, furrows or elevated ribs, tubercles, obtuse or sharp, simple or forked spines, hair-like processes, umbonations, &c. These markings are within narrow limits constant in each species, and more or less peculiar, so that they afford valuable characters to the systematist. The cytiderm itself is mostly composed of cellulose, free from appreciable inorganic matters: but in certain species contains a large amount of silex. Thus, according to De Bary, if *Closterium lunula* be carefully burnt upon a slide, a perfect hyaline silex cast of the cells is left.

The chlorophyl is variously placed in the cell, sometimes it is arranged in lamina, sometimes in spirals, sometimes in the form of

* Extracted from "A Contribution to the Natural History of the Fresh Water Algæ of North America," 1873.

radii from a central mass. These different methods afford good generic characters, and will be dwelt upon more in detail under the various genera. The colour of the chlorophyl during active life is a vivid green, which, as the vital forces lessen, changes to a faded yellowish tint.

Nægeli and others affirm that there is always a central nucleus in the Desmid, and probably do so with truth, although in many instances I have found it impossible to demonstrate its presence from the size and opaqueness of the frond, crowded with endochrome, &c. In a large number of cases, however, it is very apparent.

As ordinarily viewed under the microscope, the two most striking peculiarities presented by these little plants are the motion of the whole Desmid in the water, and the various movements exhibited within the fronds. The general movement is most apparent in the larger species, which exist free and distinct in the water, especially in the boat-shaped *Closteria*. It mostly consists of a steady, stately, slow onward movement, with sometimes backward oscillations. By virtue of it, Desmids in a bottle will often congregate in such positions as are most exposed to light. There have been various theories advanced as to the cause of this motion. Ehrenberg believed that he had found foot-like processes protruding from the end of the frond, and giving the motile power. Others, such as Rev. Mr. Osborne and Mr. Jabez Hogg, have attributed the movements to the presence of cilia, but I think have failed so entirely to establish this that their views are more than problematical. That the motion is due to vital actions taking place, especially under the action of light, is as much as can be at present affirmed with any certainty, though it is probable that the immediate agents are endosmotic currents of gas or water.

The movements of the contents within the cells are chiefly of two kinds. Taking *Closterium lunula* as an illustrative example, there will be found, on examination with an $\frac{1}{4}$ th objective, a narrow, very transparent, and, therefore, often not very apparent layer or zone lying immediately within the cell wall, between it and the endochrome, and dipping inward in the middle of the frond, so as to communicate with the nucleus. In this zone are protoplasm, watery fluid, and scattered granules. In the ends of the fronds the different portions of this zone, meeting and widening, fill up the whole of the cavity, and, within the space thus occupied by them, there is a globular, sharply defined, still more transparent vacuole. This, some have thought to be a closed sac, with a distinct wall, but it seems really to be a vacuole lying in the midst of the inner protoplasm, which, with a few green granules, occupies more or less completely the transparent zone already described. Sometimes the chlorophyl encroaches upon this zone at the ends so as to, more or less, completely surround the vacuole, within which are always found watery fluid and granules. In the protoplasmic zone, and its vacuole, active movements are probably always present during

active life. Streams of protoplasm appear to be constantly passing to and fro between the nucleus and the ends of the cell along the outer zone, and granules can be always seen passing backwards and forwards with an unsteady motion.

When streams of protoplasm are setting very actively from the centre towards one end, there will often be an accumulation of the protoplasm there, and a consequent decided lessening in the size of the vacuole, which will again expand as the return currents arouse themselves. Within the vacuoles are seen more or less numerous smaller or larger granules in active, busy motion, swarming over and about one another with an unsteady hurrying to and fro.

A form of motion, similar to this in appearance, but probably of different significance, is seen in most Desmids when in an unhealthy, feeble condition. I have seen it most marked in *Cosmarium margaritaceum*. In such fronds the endochrome has lost its deep green colour, and become shrunken, and lying within it is a great space containing myriads of minute, blackish particles swarming about actively. This peculiar state and appearance is by no means confined to the Desmids, for I have seen it very highly developed both in species of *Spirogyra* and *Ædogonium*. It appears to be connected with decay. Is it possible that these minute particles are foreign to the plant, vibrionic in nature?

In regard to the nature of the movements seen within a healthy Desmid, some have viewed them as exceedingly mysterious, the result of the presence of cilia, &c.; but these views have been so thoroughly exploded that it is scarcely necessary even to mention them here. The movements are, in truth, precisely parallel to the so-called cyclosis of the higher plants. Protoplasmic germinal matter, wherever it exists, be it in animal or vegetable, has, as one of its distinguishing characters, the power of active, spontaneous, apparently causeless movements, and it is simply the carrying out of this power or attribute which has attracted so much attention in the Desmids, because it is in them so readily seen.

There are, in this family, two distinct methods in which the species are multiplied, one with, the other without, the intervention of anything like sexuality. The non-sexual method of increase is really a modification of an ordinary vegetative process, a peculiar cell multiplication by division. In such fronds as those of the genus *Cosmarium*, which are composed of two evident halves connected by a longer or shorter isthmus, the first step in the process is an elongation of this neck. In a very short time there appears around the centre of this a constriction, and, I believe, an actual rupture of the outer coat. By this time a new wall has formed inside each half of the isthmus, and stretches also across its cavity, forming, with its fellow, a double partition wall, separating the two halves of the old frond. Rapid growth of the newly formed parts now takes place, the central ends become more and more bulging as they enlarge, and in a little time, two miniature lobules have

shaped themselves at the position of the old isthmus. These are, at first, small, colourless, and destitute of all markings, looking, as Mr. Ralfs says, like condensed gelatine. They, however, rapidly increase in size and firmness, their contents assuming a green colour, and their walls taking on the peculiar markings of the species. At last, the parts thus formed having assumed the shape and appearance of the original lobules, the two fronds, which have been developed out of one, separate mostly before the new semi-cells have acquired their full size. What part the nucleus has in the process just described, I have never actually demonstrated, but have little doubt but that it undergoes a division in the very commencement, so that the new nucleus of each secondary frond is formed out of one-half of the old one.

In proportion as the form of the Desmid becomes simpler, so do the peculiarities of its cell multiplication become less. In those species which are simple cylindrical cells, there appears to be nothing peculiar in the method of dividing, which, however, always takes place through the centre of the cell, and subsequent growth occurs, generally, only in the new found part.

True sexual reproduction apparently does not take place as freely in this family as the former process, for whilst I have seen hundreds of cells undergoing the latter, it has not been my good fortune to meet with conjugating specimens on more than two or three occasions.

The process has, however, been studied very closely by De Bary, Braun, Hofmeister, and others, and appears to consist generally in a rupture of the outer wall of two cells, and the protrusion of delicate processes from an inner, often newly-formed coat, with subsequent union of these, and consequently of the two cells, and afterwards a condensation of the contents in the enlarged connecting passage. The connecting passage between the fronds is really a sporangium in which the spore is perfected, the contents of the cell finally condensing it into a firm globe, and secreting around themselves a thick coat.

The after history of this spore has been very successfully studied by M. Hofmeister, whose observations were made upon *Cosmarium tetraophthalmum*, which he watched conjugating and forming a sort of resting spore, which was perfected early in the month of July. This was composed of a thick outer coat and green endochrome lying within as a distinct ball, nowhere in contact with the investing membranes. In three weeks time this chlorophyllous protoplasm had divided into ellipsoidal masses, or primordial cells, which soon surrounded themselves with cellulose walls, and became distinct free cells in the granular fluid which filled the cavity of the original spore. In August each of these masses was divided into two, and in the month of September the process was repeated, so that out of the original endochrome eight strong flattened primordial cells were produced. Division in some specimens ceased here, and in others took place once more, so that by the following spring all of the

living sporangia contained eight or sixteen green daughter cells, each of them discoid in outline, with a strongly marked central notch. These daughter cells were finally set free by the solution of the spore wall, as *Cosmaria* of minute size, but agreeing in all other characters with the specific form to which they belonged.

According to Braun, in the larger, more or less lunate *Closteria*, conjugation occurs in the following method: Two fronds approach one another in such a way that they lie back to back. In the middle of each of them there then appears an annular line or trench reaching through the cell wall, and accompanied by a distinct separation of the endochrome into two halves. Whilst these changes have been progressing there has also formed a new double wall at the position of the trench, so that out of the two *Closteria* two pairs of separate equal cells have been formed. Near to the larger or central end of each of these now appears a pointing transparent nipple like process. The corresponding opposing processes enlarging and meeting coalesce, so that the upper half of one *Closterium*, in the form of a daughter cell, is finally united with the upper half of the other *Closterium*, and the two lower halves are also joined together. Thus from a single pair of fronds arise two conjugating pairs of cells, and finally two sporangia, in each of which a spore is perfected.

This process does not seem, however, to be universal amongst the *Closteria*, for in many, if not all, of the smaller species, a pair of fronds produces a single sporangium.

In the genus *Palmoglaea*, in which I have had an opportunity to study the development of the spores, the process closely simulates that seen in certain of the *Spirogyra*. The contents of the cells first became broken up and confused, and almost simultaneously the nucleus disappeared, the cells became swollen at one side, and slightly bent backward, so as to form jutting processes, which meeting grew together, became confluent, and developed into a sporangium much larger than either of the parent cells. Into this sporangium the contents of the latter passed, and soon became converted into a thick-walled spore, often completely filling the cavity, and apparently with its wall adherent to that of the latter.

BRITISH GEASTERS.

In the columns of the "Gardener's Chronicle," Mr. Worthington G. Smith has from time to time contributed a synopsis of the British species of *Geaster*, with illustrations, which, by the kind permission of the editor and proprietors of that journal, we have been permitted to reproduce for the benefit of our readers.

1. ***Geaster coliformis*.** *P.*—Cooke's "Handbook," No. 1070. "Gardener's Chronicle," 1873, p. 469, fig. 86. [Pl. xv., fig. 1.] Spores .0002 in. diam.

Fig. 1.

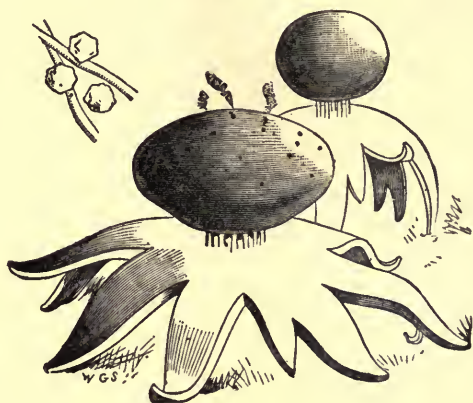


Fig. 2.

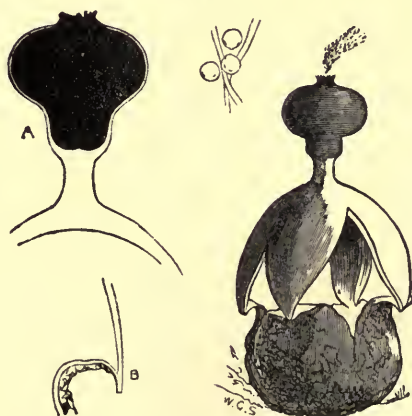


Fig. 1. *GEASTER COLIFORMIS*. P.
After Sowerby, half actual size: spores $\times 700$ diam,

Fig. 2. *GEASTER FORNICATUS*. FR.
Half actual size: section of inner peridium (A) natural size. (B) tip of lobe.
Spores $\times 700$ diam.



Fig. 1.

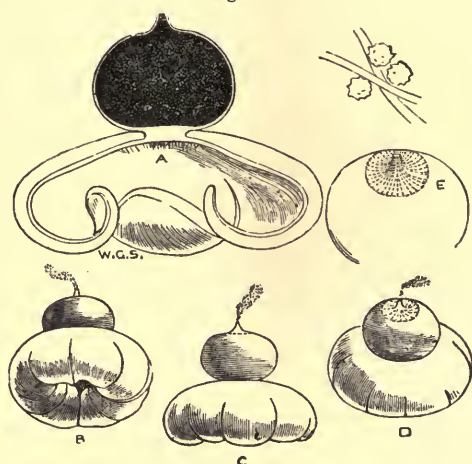
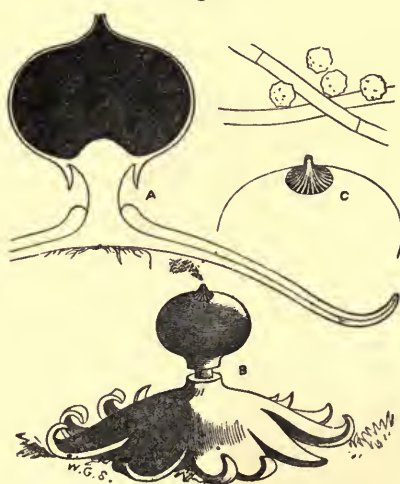


Fig. 2.

Fig. 1. *GEASTER STRIATUS*. D.C.

B, C, D, half actual size. Section (A) and mouth (E) real size.
Spores $\times 700$ diam.

Fig. 2. *GEASTER BRYANTII*. B.

Half actual size. Section of Peridium (A) and mouth (C) real size.
Spores $\times 700$ diam.

Fig. 1.

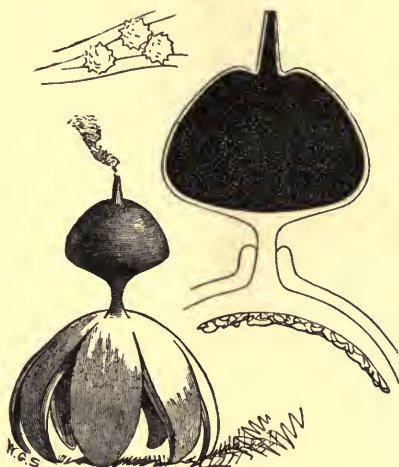


Fig. 2.

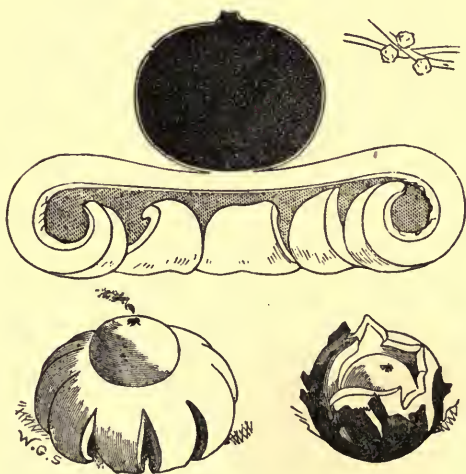


FIG. 1. GEASTER LIMBATUS, Fr.

Half actual size. Section of inner peridium real size. Spores $\times 700$ diam.

FIG. 2. GEASTER FIMBRIATUS, Fr.

Half actual size. Section real size. Spores $\times 700$ diam.

Fig. 1.

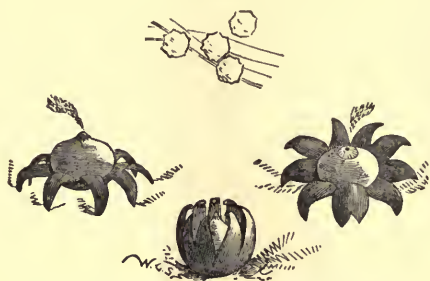
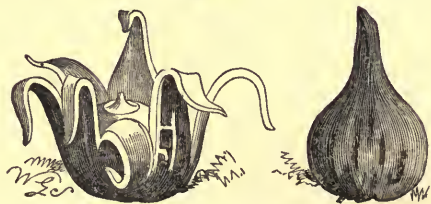
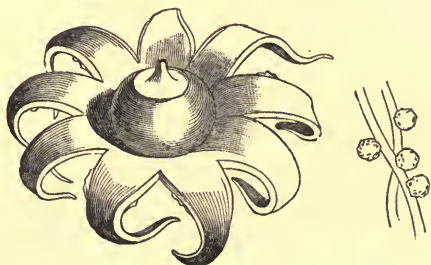
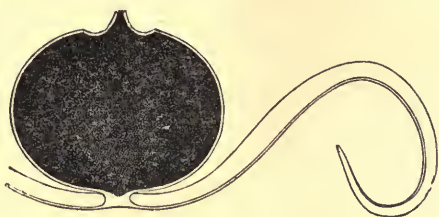


Fig. 2.



1. *GEASTER MAMMOSUS*. Chev.
After Sowerby: spores $\times 700$ diam.

2. *GEASTER RUFESCENS*. Fr.
Half actual size: section real size: spores $\times 700$ diam.



GEASTER SACCATUS, Fr.

(Reprinted, by permission, from the "Gardener's Chronicle.")

2. **Geaster fornicatus.** *Fr.*—Cooke's "Handbook," No. 1071.
"Gardener's Chronicle," 1873, p. 469, fig. 87. [Pl. xv., fig. 2.]
Spores $\cdot 00015$ in. diam.
3. **Geaster striatus.** *D.C.*—Cooke's "Handbook," No. 1072.
"Gardener's Chronicle," 1873, p. 469, fig. 88. [Pl. xvi., fig. 1.]
Spores $\cdot 00016$ in. diam.
4. **Geaster Bryantii.** *B.*—Cooke's "Handbook," No. 1073.
"Gardener's Chronicle," 1873, p. 504, fig. 94. [Pl. xvi., fig. 2.]
Spores $\cdot 00018$ in. diam.
5. **Geaster limbatus.** *Fr.*—Cooke's "Handbook," No. 1074.
"Gardener's Chronicle," 1873, p. 504, fig. 95. [Pl. xvii., fig. 1.]
Spores $\cdot 00019$ in. diameter.
6. **Geaster fimbriatus.** *Fr.*—Cooke's "Handbook," No. 1075.
"Gardener's Chronicle," 1873, p. 543, fig. 104. [Pl. xvii., fig. 2.]
Spores $\cdot 0001$ in. diam.
7. **Geaster mammosus.** *Chev.*—Cooke's "Handbook," No. 1076.
"Gardener's Chronicle," 1873, p. 543, fig. 105. [Pl. xvii., fig. 1.]
Spores $\cdot 00035$ in. diam.
8. **Geaster rufescens.** *Fr.*—Cooke's "Handbook," No. 1077.
"Gardener's Chronicle," 1873, p. 577, fig. 111. [Pl. xvii., fig. 2.]
Spores $\cdot 00017$ in. diam.
9. **Geaster hygrometricus.** *P.*—Cooke's "Handbook," No. 1078.
"Gardener's Chronicle," 1873, p. 577, fig. 112. [Pl. xiv., fig. 2.]
Spores $\cdot 00035$ in. diam.
10. **Geaster Michelianus.** *W. G. S.*—"Grevillea," vol. ii., p. 35.
Pl. xiii., "Gardener's Chronicle," 1873, p. 608, fig. 115.
Spores $\cdot 00014$ in. diam.
11. **Geaster lagenæformis.** *Vitt.*—"Grevillea," vol. ii., p. 35.
Pl. xiv., fig. 1. "Gardener's Chronicle," 1873, p. 608, fig. 116.
Cooke's "Handbook," No. 1079.
Spores smooth, $\cdot 00012$ in. diam.
12. **Geaster saccatus.** *Fr.*—"Gardener's Chronicle," 1873, p. 1275, fig. 266. [Pl. xviii.]
Outer peridium saccate, cleft into many flaccid subinvolute laciniae; interior peridium sessile, crowned with a circular flat disc, and a sharp silky mouth. Spores dark brown, slightly echinulate.
By hedge banks. Truro.
Spores $\cdot 00013$ in. diam.

The spores in all the foregoing figures are magnified 700 diameters.

THE MOSSES OF IRELAND.

Bryologists will be very glad to make the acquaintance of such a complete and careful synopsis as Dr. David Moore has recently produced of the mosses of Ireland. This synopsis was first published in the proceedings of the Royal Irish Academy (vol. i., ser. 2, Science), and since issued in a separate form, but as no publisher's name appears on the title-page, and no price is stated, we are not in a position to affirm whether it has been published in the separate form, or only printed for private circulation. The arrangement adopted is lucid and distinct, generic characters are given, with tabular diagnoses of species; these are followed by ample references to full descriptions and figures, with an enumeration of the Irish localities, ending with a copious index. Altogether here are 140 compact 8vo. pages, representing such a mass of work that we should be afraid to compute the time it must have occupied in its production. This is a valuable contribution to our literature of British Cryptogams, and we can only regret that such appear so rarely. There is in Dublin a gentleman with a world-wide reputation in his special subject, who could give us just such a synopsis of the Irish Fresh Water Algæ; we are not alone in the hope that Dr. Moore's example may induce him to achieve this new honour for Old Ireland.

PROFESSOR ÆRSTED.

Dr. R. Brown has read to the Botanical Society of Edinburgh, and it is about to be published in the annual volume of "Transactions," a Biographical Sketch of the late Professor Ærsted, of Copenhagen. Dr. Brown was specially fitted for this duty, and has done it with all reverence for the memory of his friend. Professor Ærsted was only in the 57th year of his age, and yet by diligence and perseverance he contributed much to Botanical Science. In Cryptogams, his best known researches were amongst the Fungi, on which subject Dr. Brown enumerates thirteen contributions, prominent amongst which are those relating to the connection between *Ræstelia* and *Podisoma*. Professor Ærsted died at Copenhagen, Sept. 3rd, 1872, after a week's illness from dysentery, having for twelve years occupied the chair of Botany in the University of Copenhagen.

FUNGI BRITANNICI.—The Rev. J. E. Vize, Forden Vicarage, Welshpool, announces the publication of a fasciculus of British Fungi, including the following groups:—Pucciniæi, Cæomacei, Æcidiacei, Mucedines, and Erysiphei, making altogether 100 specimens, at the price of £1. "As a further help to beginners," he also announces, "a limited set of very good microscopical slides, showing spores, &c.;" which will be prepared on application at 10s. 6d. per dozen.

THE FUNGUS SHOW AT SOUTH KENSINGTON this year was fully equal to, if not in some respects superior, to its predecessors. The great fault was a want of arrangement, of classification, and even of names. Still there was a goodly show of interesting species, and some that were new. Amongst the latter we observed, for the first time, an English specimen of *Rhizina lævigata*, Fries, exhibited by Miss Louisa Hubbard, of Horsham. There were also numerous species of *Hydnum*, and some very fine *Polyporei*. An excellent specimen of *Clavaria botrytis* arrived late, together with fresh specimens of *Rhizina undulata*, Fries. A full account of the meeting appeared in the "Gardener's Chronicle."

RELATION OF FUNGI TO OTHER PLANTS.—Their most common colouring matters exactly correspond with those found in the apothecia of lichens, and their more accidental constituents are also quite analogous to those occasionally found in the apothecia of particular lichens—for example in those of *Cladonia cornucopioides*. According to the principles adopted in this paper, fungi ought then to be looked upon not as fronds, but as the fructification of a low type of plants, and I think that the fact of the colouring matters alone leading to such a satisfactory conclusion shows that they must have some important physiological signification. * * * * Looking upon fungi from this chromatological point of view, they bear something like the same relation to lichens that the petals of a leafless parasitic plant would bear to the foliage of one of normal character—that is to say, they are, as it were, the coloured organs of reproduction of parasitic plants of a type closely approaching that of lichens, which of course is in very close, if not in absolute agreement, with the conclusions drawn by botanists from entirely different data.—H. C. SORBY, in *Proc. Roy. Soc.*

NOTE ON SOLORINA BISPORA (NYL.).

By the REV. J. M. CROMBIE, F.L.S.

In recording the occurrence of this lichen on Ben Lawers, as mentioned in last number of *Grevillea*, Dr. Stirton is mistaken in supposing that it has not been gathered elsewhere than on the Pyrenees. A reference to Continental Lichenology would have informed him that since the date of "Nylander's Synopsis" it had been found in the Tyrol by Dr. Arnold, and in North Italy by Professor Anzi. What, however, is of more consequence, is the specific value of the plant so named provisionally as a separate species. Dr. Nylander (Syn. p. 331), in speaking of it, says—"Forsitan tantum varietas *saccata* (*limbata* maxime propinqua);

sed quum transitum nullum vidi, eam seorsim exponere debui." Such a transition state, however, may be seen in Anzi "Exs. Langob.," 46, where the spores are 4-2 $\text{n}\bar{\text{a}}$, and in a specimen from Killin in my own Herb. s. n. *S. limbata*, where, however, the thecæ are usually 4-spored. *S. bispora*, therefore, cannot with propriety be regarded as distinct from *S. limbata* (Smmrft.). This latter also, as it appears to me, has but very slight claims to be separated, otherwise than as a mere variety from *S. saccata* (Linn.). Certainly as seen in the "Herbarium," and having regard only to the character of the so-called thallus, it seems sufficiently distinct. An attentive observation, however, of the plant three months ago in Killin, convinced me that an opinion I had previously entertained was correct. There it grows, always associated with *saccata*, and not only so, but in one and the same specimen occur both the type and the variety. The former evidently passes into the latter through the decay or destruction of the proper thallus, and the consequent growth or protrusion of an alien thallus. This latter, which is of a gelatinous nature, belongs either to an undeveloped *Collema*, such as *C. cheileum*, or a *Leptogium* such as *L. scotinum* (minor), (in which case it is Lichen spongiosus. (Sm., E. B. T., 1374.). This is frequently more or less suffused with a whitish *lepraria*, differing in character, on a microscopic examination, from the *pruina* which occurs on the thallus of the type. This alien thallus gradually destroys or takes the place of the proper one, leaving only a narrow thalline margin around the apothecia, which becomes at length isidiose or granulose. There can thus, I think, be little doubt that the species stands thus:—*Solorina saccata* (Linn.), with thecæ 4 spored and membranaceo-papyraceous continuous thallus; var. *limbata* (Smmrft.), with thecæ 4, rarely 2-spored, and proper thallus interrupted, and only bordering the apothecia, its place being otherwise usurped by an alien gelatinous (collemoid) thallus.

CRYPTOGAMIC LITERATURE.

O'MEARA, REV. E. Recent Researches in the Diatomaceæ, No. 7, in "Journal of Botany," for October.

NISSL, G. V. Beitrage zur Kenntniss der Pilze (continued) in "Hedwigia," No. 9.

SMITH, W. G. On Geaster *saccatus*, with fig., in "Gardener's Chronicle," p. 1275 (1873).

KITTON, F. Strange habitats of certain species of Diatomaceæ, in "Science Gossip," for October.

SORBY, H. C., F.R.S. On Comparative Vegetable Chromatology (including Cryptogamia), from the "Proceedings of the Royal Society," No. 146, vol. xxi.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By the REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 53.)

376. **Phoma macropus.** *B. & C.*—Subcuticulare, peritheciis sparsis; sporophoris flexuosis sporis oblongis 5-6 longioribus. On the white shoots of some shrub. Scattered, tearing off with the cuticle; scattered, collapsed; sporophores waved, 5-6 times longer than the short oblong spores. Nearly allied to the last, but distinct.

377. **Phoma Petersii.** *B. & C.*—Erumpens, demum superficiale, hysteriiforme in lignum dealbatum situm, sporis ellipticis, binucleatis. On wood which has been exposed to the weather, and has become bleached. Alabama, Peters. No. 5234.

Scattered, hysteriiform, erumpent, then free; spores elliptic, .0003 long, with two nuclei. Distinct from *Phoma epileucum*, B., in which the spores are .00015 long, and not so elliptic.

378. **Phoma citrulli.** *B. & C.*—Deplanatum superficiale, sporophoris sporis fusiformibus bi-trinucleatis brevioribus. On seeds of water melon. Car. Inf. No. 5031.

Flat, superficial, sporophores shorter than the fusiform 2-3 nucleate spores, .0008 long.

379. **Phoma cucurbitale.** *B. & C.*—Sparsum deplanatum nitidum; sporis breviter oblongis binucleatis minutis. On seeds of water melon.

Scattered; shining, flat; spores minute, oblong, binucleate, .0002-.00025 long.

380. **Phoma ampelinum.** *B. & C.*—Subcuticulare hysteriiforme, sporis fusiformibus. On shoots of vine. Pennsylvania, Michener. No. 4094.

Growing beneath the cuticle which swells into little hysteriiform pustules; spores oblong, subfusiform, .0005 long.

381. **Phoma pallens.** *B. & C.*—Subcuticulare hysteriiforme; sporophoris sporis utrinque apiculatis sub-æqualibus. On shoots of vine which it renders pallid. Car. Inf. No. 5015. Also on *Celastrum scandens*. Penn. Michener. No. 4127.

Growing beneath the cuticle, sporophores equal in length to the spores which are oblongo-fusiform pointed at either end, .0002-.0003 long.

382. **Phoma uvicola.** *B. & C.*—Irregulare cuticulâ anguste cinctum, sporis oblongis. On berries of *Vitis*. Car. Inf. No. 3286.

Produced beneath the cuticle, through which it bursts, and by which it is surrounded; spores oblong, .0003 long.

383. **Phoma confuens.** *B. & C.*—Maculis elevatis marginatis, peritheciis confluentibus; sporis brevibus. On branches of vine. No. 5616.

Forming little raised hysteriiform spots with a distinct margin. Perithecia black, confluent; spores shortly oblong, .0002 long.

384. **Phoma ustulatum.** *B. & C.*—Maculis helvolis, peritheciis punctiformibus; sporis utrinque attenuatis. On leaves of *Vitis æstivalis*. No. 4842.

Spots broad, red-brown; perithecia minute punctiform; spores attenuated at either end, shortly fusiform, .0003 long.

* **Phoma radula.** *B. & Br.*—Pennsylv. Michener. No. 4049. On pear. Car. Inf. No. 4998. Spores subfusiform, .0005 long.

385. **Phoma Phytolacæ.** *B. & C.*—Subcuticula dealbata oriundum; sporis fusiformibus binucleatis. On *Phytolacca*. New Jersey. No. 4702.

Black shining, covered with the bleached cuticle; spores fusiform binucleate, .0004 long, resembling those of *P. pallens*.

386. **Phoma helvolum.** *B. & C.*—Maculis helvolis definitis; peritheciis minutis; sporis minimis. On leaves of some Anonaceous plant. Texas, C. Wright. No. 3901.

Spots definite with a distinct margin reddish brown, perithecia minute; spores shortly oblong, .0001 long.

* **Phoma concentricum.** *Desm.*—On *Yucca*. New England, Russell. No. 5973. Penns., Michener. No. 4141, 4164. Alabama, Peters. No. 4569.

387. **Phoma melaleucum.** *B. & C.*—Subcuticulare nitidum e macula albida oriundum, sporis oblongis. On berry. New England, Sprague. No. 5274. On *Magnolia tripetala*. Pennsylvania, Michener. No. 4096. On *Aralia spinosa*. Alabama, Peters. No. 5185.

Growing on a pallid spot, subcuticular, shining; spores oblong, .0003 long. In No. 5274 the spores are rather narrower and .0004 long.

388. **Phoma mixtum.** *B. & C.*—Subcorticale sero liberatum, sporophoris sporis utrinque apiculatis sub æqualibus, processibus filiformibus apice curvatis intermixtis. On *Liriodendron*. Car. Inf. No. 4963. On *Viburnum opulifolium*. Penns., Michener. No. 4174.

Produced under the bark in which it forms little pustules, at

length free; sporophores about equal in length to the spores which are shortly fusiform, .00025 long, mixed with filiform processes, about three times as long, curved at the tips.

* **Phoma fibricola.** *B.*—On whitened wood of *Populus dilatata*. Penns., Michener. No. 4241.

389. **Phoma maculare.** *B. & C.*—Maculis orbicularibus brunneis immarginatis peritheciis irregularibus; sporis oblongis subcymbiformibus. On leaves of *Diplopappus*. Alabama, Beaumont. No. 4661.

Forming brown orbicular spots, in the centre of which are seated the irregular perithecia; spores oblong subcymbiform. .0004 long.

390. **Phoma chartarum.** *B. & C.*—Sparsum e subiculo tenero byssoideo oriundum, sporis minimis.

On white paper. Alabama, Beaumont. No. 5106. Perithecia scattered, each springing from some delicate radiating threads; spores very minute, .00012 long, sometimes ejected in the form of a tendril.

There are also a great many other forms in the collection which can scarcely be characterised as there are no very distinctive marks in the spores.

391. **Phoma cinctum.** *B. & C.*—Irregulare depressum materie alba cinctum, sporis oblongis angustis.

On leaves of *Ulmus Americana*. Car. Inf. No. 3791. Perithecia irregular, depressed, surrounded by a white border; spores oblong, narrow, .00027.

* **Leptothyrium Ribis.** *Libert.*—On *Ribes nigrum*. Connecticut. C. Wright. No. 5639. New England. Russell. No. 5943.

In the former the spores are wider at one end, slightly curved, .0008-.0006; in the latter often more curved, and then not dilated at one end, .001 long.

392. **Leptothyrium Celastris.** *B. & C.*—Superficiale orbiculare gregarium, sporis cylindricis.

On twigs of *Celastrum*. New England. Murray. No. 6270. Forming little black orbicular superficial specks; spores cylindrical, .001 long.

* **Leptothyrium Fragariæ.** *Libert.*—Sprague. No. 6241.

393. **Leptothyrium Lychnidis.** *B. & C.*—Maculis pallidis; peritheciis punctiformibus; sporis oblongis utrinque irregularibus.

On *Lychnis Flos cuculi*. Alabama. Peters. No. 4544. Spot pallid, perithecia very minute; spores oblong, hollowed out on either side, .0004 long.

394. **Leptothyrium punctiforme.** *B. & C.*—Sparsum minutum superficiale; sporis oblongis curvalis.

On leaves of *Erigeron*. Massachussets. No. 3387. Scattered

over the under surface without any spot; perithecia punctiform; spores oblong, more or less curved, .0008 long.

395. **Cryptosporium noveboracense.** *B. & C.*—Peritheciis deplanatis fuscis sporophoris brevibus, sporis lunatis.

On bark of *Abies*. Mountains of New York. No. 4502. Forming little flat pustules, sporophores scarcely half so long as the crescent-shaped spores, .001 long.

396. **Cryptosporium Pini.** *B. & C.*—Peritheciis papillæformibus nigris; sporophoris triplo sporis angustis curvatis uniseptatis brevioribus.

On smooth pine bark. New England. Sprague. No. 5270. Perithecia papillæform, black, at length rupturing the cuticle; sporophores about $\frac{1}{3}$ as long as the narrow crescent-shaped at length uniseptate spores attenuated at either end, .003 long.

397. **Cryptosporium filicinum.** *B. & C.*—Nitidum hysteriiforme; sporophoris duplo sporis curvatis filiformibus brevioribus.

On dead ferns. Alabama. Peters. No. 4008. On *Osmunda cinnamomea*. Penns. Michener. No. 4884. Shining hysteriiform; sporophores half as long as the thread-like curved spores, which are variable in length.

In appearance it approaches *Leptostroma*, but differs in the more highly developed spores.

* **Sphæronema rufum.** *Fr.*—On *Magnolia glauca*. *Car. Inf.* No. 4923.

398. **Sphæronema echinatum.** *B. & C.*—Peritheciis globosis; collo longo processibus echiniformibus subverticillatis ornatum; sporis filiformibus curvalis.

On twigs of *Rhododendron*. Mountains of New York. No. 4464. Perithecia minute, globose, with a long neck clothed in a verticillate manner with stiff spines; spores filiform slightly curved.

399. **Sphæronema penicillatum.** *B. & C.*—Peritheciis elongatis ventricosus e basi orbiculari oriundis, collo longo penicillato.

Car. Inf. On dead wood. No. 2134. Perithecia springing from an orbicular base, above which it is first contracted, then ventricose, ending in a long neck which is clothed with loose hairs.

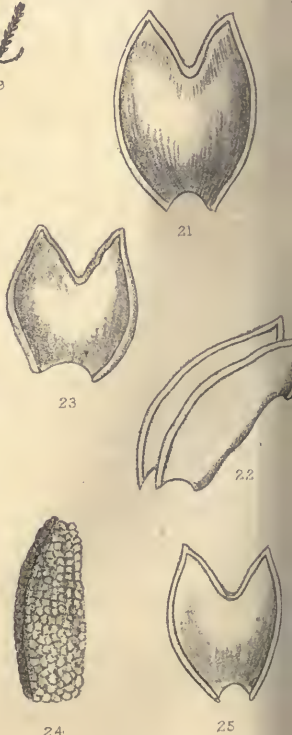
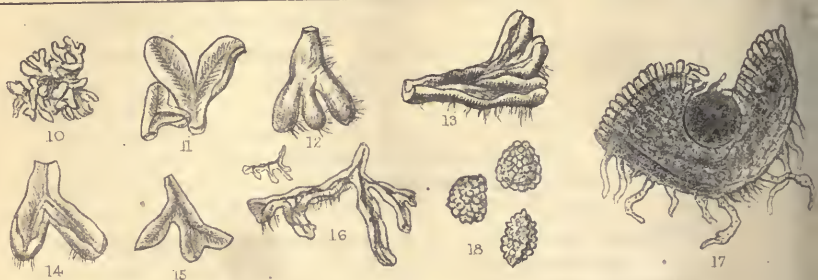
400. **Sphæronema metulæforme.** *B.*—Peritheciis fuscis metulæformibus, collo breviori apice penicellato albo.

On *Cornus florida* with *Perichaena populina*, *Fr. Car. Inf.* No. 2515. Perithecia ninepin-shaped, brown, base contracted, neck about two-thirds as long, white, with a pencil of articulated threads.

401. **Sphæronema epiglæum.** *B. & C.*—Peritheciis globosis, collo cylindrico.

On some *Tremella*, which runs up the sides of the neck and upper portion of the perithecium, which is globose, gradually passing into the cylindrical neck.





B. Carrington, del.

Cooke & Fotheringham

1-9. *RICCIA BIFURCA*. 10-18. *R. SOROCARPA*. 19-25. *NARDIA REVOLUTA*

NEW BRITISH HEPATICÆ.

By DR. CARRINGTON.

Riccia bifurca. Hoffm.

Fronds tumid, flabellate; lobes elliptic-obvate, cuspidate, retuse, or bifurcate; margin elevated, rounded; disc nearly plane, glaucous-green; lower surface sphacelate.

Hoffm. Pl. Cryp. Germ. p. 95 (*excl. syn. Micheli*). *Lindenberg's Ricciæ*, p. 65, t. 20, f. 1. *N. ab. E. Hep. Eur.*, iv., p. 396. *Syn. Hepat.* p. 600.

Hab. On limestone rocks by the shore, Barmouth, Oct. 1867! Aberffraw, *W. Wilson*, 1830! Levens Park, Westmoreland, on limestone rocks, *G. Stabler*, Feb., 1870! Head of Glen Dole, Forfar, *J. Sadler*, 1872!

Patches 2 to 3 inches in diameter (pl. 18, f. 1), glaucous-green, margin and underside purplish-black; fronds crowded and frequently imbricated, firmly attached to the surface, but from the tumid margins appearing to stand boldly from it. Like all the *Ricciæ*, the individual fronds increase by repeated bifurcations from the terminal lobes, which diverge more or less, so as to assume a pedate, or flabellate outline—not *stellate*, as usually described by authors. In old tufts, the periphery is found to describe the section of a circle, or series of circles, the centres of which, from the decay of the older fronds, are incomplete, or occupied by newer fronds.

Segments of the fronds, 3 to 6 lines in length, by a line in diameter, contracted at each end, elliptic-spathulate, rarely oblong, cuspidate at the apex (f. 4, 5), or obovate-emarginate, and more or less deeply furcate. Frequently the lobules are separated from each other by a mere chink (f. 2, 3), but near the base of the frond they are patent or divergent (f. 5). Their characteristic feature, however, is the bold, tumid border, most conspicuous near the apex, but surrounding the lobes more or less perfectly, and visible even in dry specimens. The depressed portion is broad and plane, or slightly concave (f. 6), without any defined mid-vein, as in *R. sorocarpa*. When in a state of fructification, the segments are sometimes contracted or deformed, but generally retain the peculiar *boat-like* outline. On section the border is found to be permanently thickened, not merely inflexed (f. 7). *Cellular tissue* solid, homogeneous, upper stratum columnar, intermediate portion darker-green, from the presence of numerous gonidial cells. Epidermis of the lower aspect purplish-brown, continued uniformly, or in irregular fascia over the margins.

Rootlets numerous, either capillary and translucent, or papillose within. *Sporangia* scattered irregularly over the disc of the frond, at length rupturing the epidermis. *Spores* conspicuous, dark-brown, three-angled, sub-cristate, rounded and reticulate-muricate on the outer surface (f. 8, x. 120).

The margin, in old fruit-bearing fronds, is sometimes irregularly crenate externally, and the purple stratum disposed in spots or bars,

so as to resemble scales. In this state it may be confounded with *R. nigrella*, D.C., a species first discovered by Mr. Ralfs, at Barmouth, and published under the name of *R. lamellosa*. The two species grow near each other, *R. nigrella* on damp banks, and *R. bifurca* on limestone cliffs. The former is smaller in all its parts, with linear dichotomous lobes (pl. 18, f. 9), margin membranous, entire, expanded, and dark-green when moist, but when dry remarkably inflexed, and displaying the dark-purple scales which clothe the inferior surface, and which are rounded and closely imbricated. In this state the fronds have a peculiar wiry look, quite different from their aspect after rain. In *R. lamellosa*, Raddi, the under side is concolorous, and the scales are pale and scariose, much narrower, and projecting beyond the margin.

In *R. glauca* the fronds are of uniform colour on both surfaces, texture much thinner, margins plane, acute, or slightly inflexed. From Ross Bay in Ireland, and Penzance, I have received a small var., in which the margin is purple, but not thickened as in *R. bifurca*.

When I first collected this species at Barmouth, I thought it probably a form of *R. glauca*, the fleshy habit of which might depend on the sea air, as in *Cochlearia*, *Silene*, &c. Recently, however, I have received authentic specimens from Prof. Lindberg, a drawing of which I give at fig. 4, and which differ in no respect from our own plant, except that the lobes are more oblong.

Pl. 18, fig. 1. *R. bifurca*, natural size. 2, 3, 4, 5 fronds \times 16 diam. 6, transverse section. 7, the same \times 60 diam., showing the cellular structure. 8, spores \times 250 diam. 9, *R. nigrella*, D'Cand. Upper surface when dry and inflexed, showing the lamellate scales.

***Riccia sorocarpa*. Bischoff.**

Segments of the frond linear, sub-dichotomous, carinate-sulcate, green on both surfaces; lobes thick and fleshy, oblong, obtuse, or emarginate; margin thin, glabrous, inflexed when dry; fruit scattered along the mid-vein.

R. sorocarpa, Bisch. de Hep., in Nov. Act. A. Nat. Cur., xvii., 2. p., 1053, t. 71, f. 11. (exd. syn., *R. minimæ*, Ruddi.) Syn. Hepat., p. 600. Gott. and Raben. Hep. Eur. ex. n. 23. 543.

R. minima, Leers Fl. Herborn, p. 252 (not Lindenberg Monog. der Riccieen, p. 67, t. xx., f. 2).

Hab. Great Doward Hill, near Ross, Hereford; discovered by Mr. H. M. Watkins, growing on limestone rocks, 1862!

Fronds forming shallow strata, divaricate-furcate, crowded and entangled so as to be separated with difficulty; colour pale glaucous-green on both surfaces.

Segments one to three lines in length, by $\frac{1}{4}$ to $\frac{1}{3}$ of a line broad, linear, the lobes patent or divergent. Upper surface canaliculate-sulcate, mid-vein distinct, margins expanded when moist (f. 11, 15), except near the apex, where they are thin, membranous, and erect or incurved (f. 13, 14). When dry the involution of the margin is more decided, so as to hide the upper surface, and impart to the frond a peculiar aspect (f. 16). Ventral surface nearly

of the same colour, obscured in some parts by the fibrillæ which proceed from it, and which, as in all of the *Marchantieæ* (for, as pointed out by Hoffmeister, *Riccia* is only an angiocarpous section of that tribe)—are of two kinds: simple, translucent, capillary rootlets, and others, which seem dotted, from the presence of peculiar clavate thickenings within the tubules (f. 17); sometimes the rootlets are varicose, or bulbous at the apex.

On section the frond is seen to be nearly trigonous (f. 17), texture solid and fleshy, destitute of lacunæ, central stratum chlorophyllose, superficial cells arranged in linear series, conical at the apex.

Pistillidea scattered along the carinate base of the lobes, young fruit immersed, at length elevating the epidermis until it ruptures, and allows the escape of the spores.

Spores smaller than in *R. bifurca*, but not so much so as in the figures (8 and 18), the former of which is magnified to twice the diameter, so as to show the surface markings. Colour, dark-brown, crenate reticulate.

A short notice of *R. sorocarpa* appeared in the March number of "Grevillea," by Dr. Braithwaite, so that I should not have recurred to the subject (although I had made drawings at the time with the intention of describing the species), but for the discovery of a nearly allied form, and the difficulty of discriminating such minute species from descriptions only. I trust, therefore, the figures given will facilitate the study of these interesting additions to our Flora, and perhaps lead to the recognition of cognate species.

When the new *Riccia* was first sent to me by Mr. Watkins, I referred it doubtfully to *R. sorocarpa*, for, possessing only Lindenberg's monograph, I was misled by the figure and description of his *R. minima* (under which *R. sorocarpa*, Bisch., is quoted as a synonym), but in which the lobes are acute, and purple on the under side. This form, although published in Syn. Hepat., p. 601, as a distinct species, appears to me to come very near *R. bifurca*, of which it may prove only a small variety.

The smaller forms of *R. glauca* may be distinguished by their much thinner texture, and the absence of the characteristic involution of the margins.

Lastly, from *R. nigrella*, which it approaches in size, and the linear involute lobes, it may be known by the absence of the row of roundish, purple scales with which that species is clothed externally, and which are met with in no other European *Riccia*.

Probably *R. sorocarpa* may be found in other localities; but, except after rain, it is very difficult to make it out, the particles of earth adhering to the marginal rootlets of the inflexed fronds, imparting to it nearly the same colour as the surface on which it grows.

Pl. 18, fig. 10, *R. sorocarpa*, natural size; 11, 13, 14, 15, fronds expanded $\times 16$. 12, inferior aspect of frond. 16, appearance of the segments when dry. 17, Transverse section, exposing sporangium $\times 60$. 18, spores $\times 120$ diam.

Nardia revoluta. (*N. ab. E.*) LINDB.

Leaves erecto-patent, bidentate, rigid, sub-complicate, round or elliptic-obovate, base narrowed, clasping; sinus and lobes acute, margins revolute throughout. (Fr. ?)

Sarcoscyphus revolutus, N. ab. E. Eur. Leberm. ii., p. 419., iv., p. xxxiv., Syn. Hepat., p. 8.

Jung. atrata, Mitten, Hepat. of East Indies. (Jour. Lin. Soc., 1859, p. 90.)

Sent to *Prof. Lindberg*, Aug., 1873, by *Mr. David Orr*, of Glasnevin, under the name of *Andræa alpina*. Luggielaw, Co. Wicklow, 1851.

Fronds densely cæspitose, of an intense black colour, sub-lævigata, stoloniferous at the base.

Stolons matted together, of nearly the same thickness as the stems, dark-brown, brittle, sparingly radiculose.

Shoots ascending, simple, half an inch to an inch long, rigid. Innovations from the apex or axils of the upper leaves, fasciculate.

Leaves bifariously imbricated, complicate-concave (f. 22—23); bi-dentate, erect and adpressed when dry, erecto-patent when moist; roundish or elliptic-obovate (f. 21, 25), from a somewhat narrowed base. Near the base of the stem they are smaller and more distant, gradually enlarging upwards, except when innovations are present, when the stem is interrupted, and the upper leaves scarcely exceed it in diameter (f. 25).

Lobes equal, acute, cuspidate; sinus deep, equal to about $\frac{1}{3}$ of the length of the leaf, angular, but a little rounded at the base from the recurvation of the margin. Margin narrowly but uniformly reflexed, so as to appear thickened under the lens (f. 22).

Texture of the leaves dense, polished, scarcely altered when dry, colour pitch-black, deep-brown by reflected light. Cells minute, thick-walled polygonal (f. 24), those of the margin sub-quadrate, compressed, $\frac{1}{1750}$ " broad. Cells of the middle of the leaf hexagonal, $\frac{1}{1168}$ " in length, by $\frac{1}{1750}$ " broad; basal cells more elongated ($\frac{1}{700}$ ") but not differing in breadth. Trigones small.

This interesting addition to our list of Hepaticæ was collected by *Mr. David Orr*, as long ago as 1851, but overlooked as a form of *Andræa*, which it resembles in habit and colour. Himalayan specimens, from *Dr. Hooker*, differ only in the shoots being sub-falcate, and the leaves more secund.

In size, and the emargination of the leaves, *N. revoluta* is intermediate between *N. emarginata* and *N. Funckii*, but the narrow revolute continuous border will at once distinguish it from these, and all allied species. The leaves of *N. emarginata* are usually reflexed at the base, but the lobes are blunter, and plane at the margin. (Pl. 18, fig. 19-25)

Pl. 18, f. 19, *Nardia revoluta*, natural size. 20, shoots $\times 16$ diam. 21, 23, 25, stem leaves $\times 30$. 22, lateral aspect of upper leaf (involucral?) 24, portion of the leaf to shew the reticulation and revolute border $\times 120$ diam.

NEW BRITISH LICHENS.

Communicated by the REV. J. M. CROMBIE, F.L.S., &c.

The following *new species* of British Lichens have been described by Dr. Nylander in the "Flora," 1873, pp. 289-300.

1. **Lecanora fugiens.** *Nyl.*—Thallus glaucescent, opaque, thin or very thin, unequal, effuse; apothecia whitish flesh-coloured, minute, with entire white thalline margin; spores 8 μ , ellipsoid, 0,009-13 m.m. long, 0,005-6 m.m. thick; paraphyses slender; hymeneal gelatine (especially the thecæ) bluish and then tawny wine-red with iodine.

On dry rocks in the Island of Jersey (Larbalestier). This species belongs to the section of *L. piniperda*, Krb., and has the spermatia arcuate.

2. **Lecanora actæa.** *Nyl.*—Thallus leaden-greyish, unequal, rimoso-diffract, moderate or thinnish, somewhat bluish and white, fimbriated at the circumference; apothecia blackish, slightly prominent, at length convex, biatorine; spores 8 μ , ellipsoid or subfusiform, 1-septate, 0,012-14 m.m. long, 0,00045 m.m. thick; epithecium dark-bluish; paraphyses thickish, articulated; hymeneal gelatine, bluish, and the thecæ at length violet with iodine.

On maritime rocks in the Island of Jersey (Larbalestier). A peculiar species belonging to the section of *Lecanora erysibe* (Ach.)

3. **Lecanora spodophæiza.** *Nyl.*—Thallus greyish, moderate, granuloso-verrucose, thinly white-fimbriated at the extreme circumference; apothecia badio-reddish, somewhat plane, with subentire, scarcely prominent thalline margin; spores 8 μ , oblong or fusiform-oblong, simple, or often spuriously 1-septate, variable, 0,009-18 m.m. long, 0,004-6 m.m. thick; epithecium faintly brownish; hymeneal gelatine at first slightly bluish, and then wine-red with iodine.

On maritime rocks in the Island of Jersey (Larbalestier). This species has the appearance of *Lecanora poliophæa* or *spodophæa*, but in reality belongs to the section of *L. erysibe*. The spermatia are arcuate.

4. **Lecidea atropurpurascens.** *Nyl.*—Somewhat similar to *L. atro-purpurea*, Schær, but differing amongst other characters in having the hymeneal gelatine intensely and persistently bluish with iodine.

On aged oaks in the New Forest, near Ministeed (Crombie, April, 1868).

5. **Lecidea subsphæroides.** *Nyl.*—Thallus whitish, thin, areolato-rimose, rugulose; apothecia pale-reddish, margined, at length convex, the margin excluded, moderate; spores 8 μ , ellipsoid, or oblongo-ellipsoid, 1-septate, 0,014-17 m.m. long, 0,006-7 m.m. thick; paraphyses not discrete; hymeneal gelatine bluish and the thecæ violet with iodine.

On young beech trees, near Lyndhurst, in the New Forest. (Crombie, April, 1873.) Belonging to the same section as the preceding.

6. **Lecidea hemipolioides.** *Nyl.*—Thallus greyish-green, thin, subopaque, rugulose, indeterminate; apothecia pale or livid, convex, immarginate, colourless within; spores 8 $\text{n}\ddot{\text{a}}$, oblong, usually somewhat curved, 3-septate, 0,012-18 m.m. long, 0,0045 m.m. thick; paraphyses not very well discrete, slender, epithecium colourless; hymeneal gelatine, especially the thecae, at first bluish, then tawny wine-coloured or reddish with iodine.

On rocks, Jersey (Larbalestier). Distinct from *L. arceutina** *hemipolia*, *Nyl.*

7. **Lecidea carneo-glauc.** *Nyl.*—Thallus glaucons-green, thin, opaque, subleprose, whitish, limited at the circumference, K—C—; apothecia sordid, or pale flesh-coloured, convex, immarginate, whitish within; spores 8 $\text{n}\ddot{\text{a}}$, attenuato-fusiform, 1-5 septate, 0,025-40 m.m. long, 0,0030-35 m.m. thick; epithecium and hypothecium colourless; paraphyses slender, not very well discrete; hymeneal gelatine bluish, and then tawny with iodine.

On siliceous stones, Jersey (Larbalestier). Belonging to the section of *L. luteola*. The spermogones are pale, urceolate, with oblong spermatia.

8. **Lecidea scotinodes.** *Nyl.*—Thallus dark-greyish, thin, unequal, areolato-rimose, subdeterminate; apothecia black, convex, immarginate, whitish within; spores 8 $\text{n}\ddot{\text{a}}$, colourless, oblong, simple, or 1-septate, 0,014-18 m.m. long, 0,005-6 m.m. thick; paraphyses moderate, incrassate at the apices, dark bluish-black; hypothecium colourless; epithecium K—, faintly violet; hymeneal gelatine bluish, and then wine-red with iodine.

On micaceous rocks, Craig Tulloch, Blair Athole (Crombie, August, 1871). Allied to *L. scotina* (Krb.) from which it differs by the above characters.

9. **Lecidea contiguella.** *Nyl.*—Thallus whitish, thin, areolato-rimose, surrounded at the circumference by a black hypothallus, K—; apothecia black, adnate, plane, margined, within concolorous; spores 8 $\text{n}\ddot{\text{a}}$, colourless, oblong, simple, 0,011-15 m.m. long, 0,0045-55 m.m. thick; epithecium dark-bluish, hypothecium brown; paraphyses moderate; hymeneal gelatine bluish, then wine-reddish with iodine.

On quartzose boulders, Morrone Braemar (Crombie, August, 1872). Differs in the above characters from *L. lactea*, Flh.

10. **Lecidea deludens.** *Nyl.*—Thallus whitish, firm, thin, rimose, K + pale yellowish, surrounded by a very thin, black hypothallus; apothecia black, innate, circumcised, plane, obtusely margined, concolorous within; spores brown, 1-septate, 0,022-27 m.m. long, 0,008-13 m.m. thick; paraphyses discrete, regular, moderate, clavate, brownish, hypothecium brown; hymeneal gelatine intensely bluish with iodine.

On weathered quartzose stones on the summit of Cairn Gowar, Blair Athole (Crombie, August, 1871). Allied to *L. colludens*, Nyl.

11. ***Lecidea subgyratula***. Nyl.—Thallus blackish, very thin, opaque, sub-rimose, apothecia black, gyroso-rugose, minute; spores 8 næ, 0,012-16 m.m. long, 0,008-10 m.m. thick; epithecium brownish, paraphyses slender, not discrete, hypothecium blackish; hymeneal gelatine pale bluish, and then tawny wine-red with iodine.

On stones on the ground near the summit of Morrone (Crombie, August, 1872). Looks like *Lecanora simplex*, but is allied to *Lecidea umbonatulula*, Nyl.

12. ***Lecidea confœderans***. Nyl.—Thallus scarcely any visible; apothecia black, plane, obtusely margined, verrucoso-congested (verrucæ composed of 20-30 or more apothecia), within blackish; spores 8 næ, oblong, simple, 0,010-11 m.m. long, 0,003-4 m.m. thick; paraphyses moderate or thickish, clavato-incrassate and bluish-black or greenish-blue at the apices; hypothecium thick, brownish black (K purplish).

On quartzose boulders, Morrone, Braemar (Crombie, August, 1872). A very distinct species.

13. ***Lecidea delimis***. Nyl.—Thallus dark-greyish, verrucoso-granulate or rugose, moderate, hypothallus subfimbriated, infusate, limiting the thallus; apothecia black, at length convex, immarginate, greyish-suffused, within concolorous; spores 8 næ, colourless, oblong, 3-septate, 0,015-18 m.m. long, 0,004-5 m.m. thick; epithecium granulose, paraphyses moderate, soft, hypothecium thick, black; hymeneal gelatine tawny-wine-coloured or somewhat reddish with iodine.

On granite rocks, Jersey (Larbalestier). Looks like an *Opegrapha*, but belongs to the section of *Lecidea premnea*.

14. ***Lecidea subviridis***. Nyl.—Thallus greenish or dark-green, somewhat shining, rugulose; apothecia black, minute, plane, distinctly margined, within whitish; spores 8 næ, colourless, oviform, 1-septate, 0,011-16 m.m. long, 0,005-7 m.m. thick; epithecium brown, paraphyses moderate, hypothecium colourless; hymeneal gelatine bluish, then tawny-red with iodine.

On siliceous stones, Jersey (Larbalestier). Belongs probably to the section of *L. arthoniza*.

15. ***Lecidea lutulata***. Nyl.—Thallus yellow-ochraceous, thin, leprose or indistinct; apothecia black, convex, immarginate, within concolorous; spores 8 næ, colourless, ellipsoid or oviform, simple, 0,007-9 m.m. long, 0,003-4 m.m. thick; paraphyses not discrete, epithecium bluish, hypothecium thick, brownish-black; hymeneal gelatine bluish, and then tawny wine-red with iodine.

On maritime rocks, Jersey (Larbalestier). Belongs probably to the section of *L. dispansa*, Nyl.

DR. HORATIO WOOD'S METHOD FOR PRESERVING FRESH WATER ALGÆ.*

There are three or four distinct classes of localities, in each of which a different set of forms may be looked for. These are stagnant ditches and pools, springs, rivulets, large rivers, and other bodies of pure water, dripping rocks in ravines, &c.; trunks of old trees, boards, branches and twigs of living trees, and other localities.

In regard to the first—*stagnant waters*—in these the most conspicuous forms are *Oscillatoria* and *Zygnemaceæ*. The *Oscillatoria* may almost always be recognised at once by their forming dense slimy strata, floating or attached, generally with very fine rays extending from the mass, like a long, delicate fringe. The stratum is rarely of a bright green colour, but is mostly dark, dull greenish, blackish, purplish, blue, &c. The *Oscillatoria* are equally valuable as specimens at all times and seasons, as their fruit is not known, and the characters defining the species do not depend upon sexual organs. The *Zygnemas* are the bright green, evidently filamentous, slimy masses, which float on ditches, or lie in them, entangled amongst the water plants, sticks, twigs, &c. They are only of scientific value when in fruit, as it is only at such times that they can be determined. Excepting in the case of one or two very large forms, it is impossible to tell with the naked eye with certainty whether a *Zygnema* is in fruit or not; but there are one or two practical points, the remembrance of which will very greatly enhance the probable yield of an afternoon's search. In the first place the fruiting season is in the spring and early summer, the latter part of March, May, and June being the months when the collector will be best repaid for looking for this family. Again, when these plants are fruiting they lose their bright green colour and become dingy, often yellowish, and very dirty looking—just such specimens as the tyro would pass by. The fine, bright green, handsome masses of these algæ are rarely worth carrying home. After all, however, much must be left to chance; the best way is to gather small quantities from numerous localities, keeping them separate until they can be examined.

Adhering to the various larger plants, to floating matters, twigs, stones, &c., in ditches, will often be found filamentous Algæ, which make fine filmy fringes around the stems, or on the edges of the leaves, or perchance one may meet with *Rivalaria* or *Nostocs*, &c., forming little green or brownish balls, or indefinite protuberances attached to small stems or leaves. These latter forms are to be looked for, especially late in the season, and whenever seen should be secured.

In the latter part of summer there is often a brownish, gelatinous

* Extracted from "A Contribution to the Natural History of the Fresh Water Algæ of America." Washington, 1873.

scum to be seen floating on ditches. Portions of this should be preserved, as it frequently contains interesting Nostocs and other plants.

In regard to *large rivers*, the time of year in which I have been most successful in such localities is the latter summer months. *Springs* and small bodies of clear water may be searched with a hope of reward at any time of the year when they are not actually frozen up. I have found some exceedingly beautiful and rare Algæ in such places as early as March, and in open seasons they may be collected even earlier than this. The Desmids are most abundant in the spring, and possibly most beautiful then. They, however, rarely conjugate at that time, and the most valuable specimens are therefore to be obtained later—during the summer and autumn months, at least, so it is said; and the experience I have had with this family seems to confirm it. *Rivulets* should be watched especially in early spring, and during the summer months.

From the time when the weather first grows cool in the autumn, on until the cold weather has fairly set in, and the reign of ice and snow commences, is the period during which the Algæ hunter should search carefully all wet, *dripping rocks*, for specimens. Amongst the stems of wet mosses—in dark, damp crevices, and little grottos beneath shelving rocks—is the Algæ harvest to be reaped at this season. Nostocs, Palmellas, conjugating Desmids, Sirosiphons, various unicellular Algæ, then flourish in such localities. My experience has been that late in the autumn ravines, railroad cuttings, rocky river-banks, &c., reward time and labour better than any other localities.

The Vaucherias, which grow frequently on wet ground, as well as submerged, fruit in the early spring and summer in this latitude, and are therefore to be collected at such times, since they are only worth preserving when in fruit.

In regard to Algæ which grow on trees, I have found but a single species, and do not think they are at all abundant in this latitude. Further south, they seem to be the most abundant forms.

As to the preservation of Algæ, most of the submerged species are spoiled by drying. Studies of them should always, when practicable, be made whilst fresh. Circumstances, however, will often prevent this, and I have found that they may be preserved for a certain period, say three or four months, without very much change, in a strong solution of acetate of alumina.

An even better preservative, however, and one much more easily obtained, is carbolic acid, for I have studied Desmids with great satisfaction which had been preserved for five or six years in a watery solution of this substance. In regard to the strength of the solution, I have no fixed rule, always simply shaking up a few drops of the acid with the water, until the latter is very decidedly impregnated with it, as indicated by the senses of smell and taste.

Almost all species of Algæ which are firm and semi-cartilaginous, or almost woody in consistency, are best preserved by simply drying them, and keeping them in the ordinary manner for small plants. The fresh-water Algæ which bear this treatment well belong to the *Phycochromophyceæ*, such as the *Nostocs*, *Scytonema*, &c., the true confervas not enduring such treatment at all. When dried plants are to be studied, fragments of them should be soaked for a few minutes in warm, or for a longer time in cold water.

The only satisfactory way that Algæ can be finally prepared for the cabinet is by mounting them whole or in portions, according to size, for the microscope. Of the best methods of doing this the present is hardly the time to speak; but a word as to the way of cleaning them will not be out of place. Many of them, especially the large filamentous ones, may be washed by holding them fast upon an ordinary microscope slide, with a bent needle, or a pair of forceps, and allowing water to flow or slop over them freely, whilst they are rubbed with a stiffish camel's-hair pencil or brush. In other cases, the best-plan is to put a mass of the specimens in a bottle half-full of water, and shake the whole violently, drawing off the water from the plants in some way, and repeating the process with fresh additions of water, until the plants are well scoured. At first sight, this process would seem exceedingly rough, and liable to spoil the specimens, but I have never seen bad results from it, at least when practised with judgment. The water seems so to envelope and protect the little plants, that they are not injured.

After all, in many instances it appears impossible to clean these Algæ without utterly ruining and destroying them, so that he who despises and rejects mounted specimens simply because they are dirty and unsightly, will often reject that which, scientifically speaking, is most valuable and attractive.

In finally mounting these plants, the only proper way is to place them in some preservative solution within a cell on a slide. After trial of solution of acetate of alumina and various other preservative fluids, I have settled upon a very weak solution of carbolic acid, as the best possible liquid to mount these plants in. Acetate of alumina would be very satisfactory were it not for the very great tendency of the solution to deposit minute granules, and thus spoil the specimens. As every one knows, the great difficulty in preserving microscopic objects in the moist way is the perverse tendency of the cells to leak, and consequently slowly to allow entrance to the air and spoil the specimens.

As I have frequently found to my great chagrin, the fact that a slide has remained unchanged for six months, or even a year, is no guarantee that it will remain so indefinitely. It becomes, therefore, exceedingly important to find some way of putting up microscopic objects that can be relied on for their preservation. Where carbolated glycerine jelly or Canada balsam can be used,

the solid coating which they form around the specimens constitutes the best known protection. Except in case of the Diatoms, however, these substances so shrivel and distort the fresh water algæ immersed in them as to utterly ruin them. I lost so many specimens by the old ways of mounting, that, becoming disheartened, I gave up all idea of making a permanent cabinet, until a new cement, invented by Dr. J. G. Hunt, of this city, was brought to my notice. This is prepared as follows:—

Take damar gum, any quantity, and dissolve it in benzole; the solution may be hastened by heat. After obtaining a solution just thick enough to drop readily from the brush, add enough of the finest dry oxide of zinc, previously triturated in a mortar with a small quantity of benzole, until the solution becomes white when thoroughly stirred. If not too much zinc has been added, the solution will drop quickly from the brush, flow readily, and dry quickly enough for convenient work. It will adhere, if worked properly, when the cell-cover is pressed down, even when glycerine is used for the preservative medium. Keep in an alcohol-lamp bottle with a tight lid, and secure the brush for applying the cement in the lid of the bottle.

Its advantages lie in the circumstance that the glass cover can be placed upon the ring of it whilst still fresh and soft, and that in drying it adheres to both cover and slide, so as to form a joint between them of the width of the ring of cement, and not, as with asphaltum, gold size, &c., simply at the edge and upon the outside of the cover. It is readily to be seen how much less liability to leakage must result from this. The method of mounting with it is as follows:—A ring of any desired size is made by means of an ordinary Shadbolt's turn-table, upon a slide, which is then placed to one side to dry. When required for use, the specimen, cover, &c., being all prepared and ready, the slide is again placed upon the turn-table, and a new ring of cement put directly upon the old one. The specimen is immediately placed within the cell thus formed, and the requisite quantity of the carbolated water placed upon it. The cover, which must be large enough to entirely or nearly cover the cement ring, is now picked up with the forceps, the under side being moistened by the breath to prevent adhesion of air-bubbles, and placed carefully in position. It is now to be carefully and equably pressed down with some force. By this any superfluous water is squeezed out, and the cover is forced down into the cement which rises as a little ring around its edge. The pressure is best made with a stiff needle, at first on the centre, and then upon the edges of the cover, which may finally be made slowly to revolve underneath the needle point. The slide may then be put aside to dry; or better, an outside ring of the cement thrown over its edge in the usual manner. Where a deep cell is required, several coats of the cement should be placed one over the other, each being allowed to dry in turn. If time be an object, and only

a shallow cell be necessary, the first ring of cement may be dispensed with, and the whole mounting of the specimen be done in a few minutes. Even with this cement, and the utmost care in mounting, the cabinet should be occasionally inspected, for there will always be some slides into which air will penetrate. When such are found efforts may be made to stop the leak by new rings of cement overlaid upon the old; but very often entire remounting of the specimen is the only satisfactory cure.

VIENNESE FUNGI.—The only fungi that I have seen exposed for sale in Vienna are Truffles from France. Dried slices and fragments of *Boletus edulis*—common in every shop at which dry food substances are sold—and in the markets *Agaricus melleus*. I find that *Agaricus campestris* and *Ag. arvensis* are well known and eaten, but I have not seen them during my peregrinations. Bushels of *Agaricus melleus* have been exposed for sale during the past month.—[ED. GREVILLEA.]

FUNGUS FORAY OF THE WOOLHOPE CLUB.—During the third week in October some very pleasant excursions were made in the neighbourhood of Hereford, by the members of this Field Club, and their friends. The meeting being held this year at a more advanced period of the autumn than heretofore, a different class of fungi was consequently met with. On the 23rd the Rev. M. J. Berkeley accompanied the members on an excursion to Holm Lacy, where a profusion of *Geoglossum olivaceum*, P., was found, or rather an interesting variety of this species, in which the stem, although perfectly smooth, was of a bright green colour. It grew gregariously amongst short grass, on a mossy lawn, and will be represented in the forthcoming fasciculus of *Fungi Britannici Exsiccati*. Upon the same occasion were found *Agaricus icterinus*, Fr., *Hygrophorus fornicatus*, Fr., and *Clavaria curta*, Fr., all previously unrecorded as British species. Upon the tables were specimens of the following less common species:—*A. gloiocephalus*, Fr., *Cantharellus umbonatus*, P., *Hygrophorus Haughtonii*, B. & Br., *Lactarius uvidus*, Fr., *Polyporus Schweinitzii*, Fr., *Thelephora multizonata*, B. & Br., *Hyphomyces torminosus*, Tul., *Marasmius Hudsoni*, Fr., and many others. On the following day an excursion was made to Moccas Court, where specimens of *Clavaria purpurea*, Müll, *Cl. umbrina*, B., *Hygrophorus russocoriaceus*, B. & M., and numerous other highly interesting species were found. During the meeting the following papers were read:—Mr. C. E. Broome on “New Genera of Fungi;” Mr. James Renny on “*Saprolegniei*;” Mr. Wm. Phillips on “The Fungi of Charcoal Beds;” and on “The Fungi of Gerard’s Herbal,” by the undersigned

King’s Lynn.

CHARLES B. PLOWRIGHT.

Grevillea,

A MONTHLY RECORD OF CRYPTOGRAMIC BOTANY
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By the REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from page 84.)

*451. **Coccularia stictica.** B.—Peritheciis punctiformibus nigris; sporis breviter ellipticis. On dead bark. Car. Inf. No. 2235. On *Platanus*. Ravenel. No. 1532.

Perithecia punctiform, black; spores shortly elliptic, nearly as broad as long, with a distinct nucleus $\cdot 0003$ long. Sometimes two perithecia become confluent.

***Excipula strigosa.** Fr.—On *Sambucus pubens*. Mountains of Car. Sup. No. 4492.

Spores $\cdot 0008$ long.

452. **Excipula erumpens.** B.—Congesta erumpens glabra; sporis curvulis breviter apiculatis. On stems of *Phytolacca*. Penns., Michener. No. 3601.

Erumpent smooth; spores slightly curved, shortly apiculate, with from 2 to 4 nuclei, $\cdot 0006$ long.

453. **Excipula punctiformis.** B.—Punctiformis hispida; sporis curvis fortiter apiculatis latiusculis. On an old corn broom. Car. Inf. No. 1752.

Punctiform superficial hispid; spores curved enucleate, strongly apiculate, rather broad.

454. **Dinemasporium Pezizula.** Lev.—Pezizæforme hirtum; sporis curvatis angustis, 5 nucleatis. On *Sambucus pubens*, mountains of Car. Sup., No. 4492.

Regular, pezizæform, hairy, spores curved.

* **Asteroma pomigena.** Schwein!—On apples. New England. Sprague, No. 5410.

* **Asteroma Rosæ.** Libert.—On rose leaves. Car. Inf., No. 3676.

455. **Asteroma punctiforme.** B.—Punctiforme; floccis radiantibus tenerrimis; sporis simplicibus cymbiformibus 3-4 nucleatis. On rose leaves, No. 5946.

Minute, punctiform, with extremely delicate radiating threads;

* The manuscript of the intervening numbers having been lost in transmission, they must be replaced at a future time.

spores slightly cymbæform, .0008 inch long, .00016 wide, with from three to four nuclei.

456. **Asteroma atramentarium.** *B.*—Nigerrimum compactum expansum; floccis radiantibus reticulatis; peritheciis minutis; sporis brevibus subcymbyformibus. On leaves of *Amelanchier* and *Pyrus arbutifolia*. Car. Inf., No. 1773.

Forming broad black patches, with a reticulated radiating border; perithecia minute; spores shortly cymbiform, about .0005 long.

* **Asteroma Robergei.** *Desm.*—On the inner side of stems of *Arundinaria*. Car. Inf., No. 3213.

Endobotrya. *B. & C.*—Perithecia abdita; sporæ clavatæ pedunculatæ; episporium reticulatum; endosporium e cellulis globosis nucleatis transversim subseriatis.

457. **Endobotrya elegans.** *B. & C.*—On branches of beech. Maine. No. 5703. Perithecia concealed by the bark; spores .002 inch long, oozing out and forming black orbicular patches, clavate, pedunculate; external coat hyaline at first, continuous, then reticulated; endochrome consisting of globose nucleated, at length separable divisions, which are at first arranged in transverse layers. This is probably a state of some *Sphæria*, but the structure is so curious that for the present it is left under the name originally proposed.

458. **Cytispora orthospora.** *B. & C.*—Pustulis parvis, demum erumpentibus planis; sporis lineari-oblongis. On *Robinia*. Penns., Mich., No. 5158. New Jersey, No. 4681.

Pustules at length bursting through the bark, plane above; perithecia with a flat expanded base; spores .0004 inch long. In the Pennsylvanian plant the pustules are quite concealed by the bark, having probably not arrived at maturity, and the spores are rather longer, .0005 inch.

459. **Cytispora abnormis.** *B. & C.*—Pustulis minutis apice tantum erumpentibus; sporis oblongis binucleatis. On twigs of *Robinia*. Car. Inf.

Pustules minute, entirely covered by the bark, with the exception of the apex; spores oblong, .0003 inch long with two nuclei.

460. **Cytispora parva.** *B. & C.*—Pustulis minutis apice tantum punctiformi erumpentibus; peritheciis globosis; sporis oblongis angustis enucleatis. On twigs of *Robinia*. Car. Inf. No. 3424.

Pustules small, piercing the cuticle by the minute apex; perithecia globose; spores oblong, narrower than the last, but of equal length.

461. **Cytispora ficicola.** *B. & C.*—Pustulis minutis; peritheciis globosis, sporis oblongis curvulis. On twigs of fig. Pennsylvania, Michener, No. 4011.

Pustules minute, covered by the cuticle; perithecia globose; spores sausage-shaped .0003 inch long.

462. **Cytispora leucophthalma.** *B. & C.*—Pustulis minutis, apice niveo ostiolo atro percurso; peritheciis in stromate nigro conditis; sporis minutissimis curvulis.

On bark of *Cerasus caroliniensis*. *Car. Inf.* No. 2769. New Jersey. No. 4677.

Pustules minute, bursting through the bark by the snowwhite apex, which is pierced by the black common aperture in the centre; perithecia globose or elliptic in a black stroma; spores curved, very minute. The New Jersey plant, which was formerly named *C. nivosa*, has rather longer spores, but may be considered a variety. *C. niphostoma*, Mont. is very different.

463. **Cytispora Gordoniae.** *B.*—Pustulis minutis immersis; sporis brevibus, fortiter curvatis utrinque angustioribus. On peduncles of *Gordonia lasiantha*. *Car. Sup.* No. 700.

Pustules minute, subcutaneous; spores short, strongly curved, thicker in the middle.

* **Cytispora Persicæ.** *Schwein.*—On peach twigs. New York. Sartwell. No. 2655.

464. **Cytispora chloroglæa.** *B. & C.*—Pustulis oblongis hysteriiformibus, apice planis; sporis curvulis minutissimis chlorinis. On twigs of *Cornus sericea*. Mountains of New York, No. 4500.

Pustules oblong hysteriiform, bursting through the bark, flat above; spores very minute, sausage-shaped. The following *Cytisporæ*, with sausage-shaped spores, have been distributed under the following names:—*C. LAXA*, *B. & C.*, on *Calycanthus*. *Car. Inf.* No. 3209. *C. CORYNEOIDES*, *B. & C.*, No. 5938. On *Vitis labrusca*. *C. PUSTULATA*, *B. & C.* No. 4387. On roots of *Quercus alba*. Pennsylvania, Michener. *C. MICHENERI*, on ash. Pennsylvania, No. 5142. *C. AILANTHI*, *B. & C.* *Car. Sup.* No. 3432.

* **Cytispora rhuinæ.** *Schwein.*—On *Rhus*. Maine, Rev. J. Blake. Spores .0002 inch long.

* **Cytispora leucosperma.** *Fr.*—On twigs of various trees, under twenty different numbers, from various localities.

* **Cytispora rubescens.** *Fr.*—On *Pyrus Americana*. Mountains of New York. No. 4432, 4473. On poplar. New England, Russell. No. 5912.

* **Cytispora hyalosperma.** *Fr.*—On *Acer rubrum*. *Car. Sup.* No. 20.

* **Cytispora aurea.** *Fr.*—Boston. Sprague. No. 6265.

* **Cytispora chrysosperma.** *Fr.*—On *Populus græca*. Pennsylvania, Michener. No. 3542.

* **Cytispora pinastri.** *Fr.*—New England. Russell. No. 5960.

* **Cytispora carbonacea.** *Fr.*—Ohio. Lea. No. 131.

* **Micropera Drupacearum.** *Lér.*—On *Prunus* and *Cerasus*

avium. Pennsylvania, Michener. No. 3537, 4186. Maine, E. S. Morse. No. 5440.

465. **Micropera rubida**. *B. & C.*—Transversim erumpens, rubida; sporis filiformibus longissimis. On cherry. Pennsylvania, Michener. No. 3934.

Bursting transversely through the bark, reddish within and without; spores thread-shaped, very long, the endochrome here and there interrupted.

* **Discella carbonacea**. *B. & Br.*—On willow twigs. Maine. Rev. J. Blake. No. 6304.

466. **Discella effusa**. *B. & B.*—Pustulis punctiformibus stratum nigrum efformantibus; sporis oblongis, angustis. On decaying apples. Pennsylvania, Michener. No. 3541.

Pustules minute, crowded into black effused spots; spores oblong, .0008 long, .00016 wide, without any nucleus.

467. **Discella rugosa**. *B. & C.*—Pustulis sparsis curvulis subhysterii formibus; sporis oblongis utrinque attenuatis, endochromate utrinque retracto. On *Acer rubrum*. Pennsylvania, Michener.

Pustules scattered hysteriiform, slightly curved, here and there dotted with the slightly prominent ostiola; spores pedicellate, oblong, attenuated, slight at either extremity, .0005 inch long; endochrome retracted towards either apex; pedicel as long as the spores.

468. **Discella Magnoliæ**. *B. & C.*—Pustulis sparsis, apice tantum nudis; sporis oblongis brevioribus. On twigs of *Magnolia cordata*. Virginian mountains. No. 3359.

Pustules small, covered with the cuticle, which is not discoloured, except at the apex; spores .0003 inch long, oblong, .00008 wide; pedicels as long as the spores.

469. **Discella obscura**. *B. & C.*—Pustulis minutis depressis sparsis fuscis, epidermide tectis; sporis oblongis. On twigs of *Acer striatum*. Massachusetts. No. 3395.

Pustules minute, rather irregular, depressed, covered with the transparent cuticle through which their brown tint is visible; spores oblong, .0003-.0006 long, slightly wider than in the last.

470. **Discella microspora**. *B. & C.*—Pustulis parvis elongatis depressis; sporis brevibus subellipticis. On twigs of *Ceanothus Americanus*. Pennsylvania, Michener. No. 3599.

Pustules elongated, depressed, covered with the cuticle, which at length becomes transparent in the centre and bursts; spores subelliptic, .0003 long, .00013 wide.

* **Phlyctæna vagabunda**. *Desm.*—On stems of *Phytolacca*. Alabama, Beaumont, No. 4656; spores, .0006 long.

471. **Phlyctæna arcuata**. *B.*—Pustulis minutis, epidermide

tectis, sporis filiformibus apice hamatis. On dead *Solidago*. New England. Russell. No. 5814—5915.

Pustules minute slightly convex, covered with the cuticle; spores filiform, curved over at the apex, $\cdot 001$ long.

472. **Phlyctæna orthospora.** *B. & C.*—Pustulis oblongis fusco-marginatis; sporis oblongis. On *Phytolacca*. Pennsylvania, Michener.

Pustules oblong covered with the cuticle, with a narrow brown border; spores oblong, $\cdot 00062$ long.

* **Melanconium magnum.** *B.*—On *Acer*. Connecticut. Wright. No. 5615—5646; spores $\cdot 001\text{--}\cdot 0015$ long.

473. **Melanconium cellulosum.** *B. & C.*—Pustulis ellipticis, rima apertis; stromate celluloso; sporis oblongis nucleatis. On stems of *Rhus radicans*. Pennsylvania. Michener. No. 5130.

Pustules elliptic covered with the cuticle which splits along the major axis, cellular within; spores oblong with a nucleus $\cdot 00057$ long.

474. **Melanconium cinctum.** *B. & C.*—Pustulis nigris epidermide cinctis; sporis obovatis. On small branches of *Castanea pumila*. Mountains Car. Sup. No. 4451.

Pustules black, surrounded by the cuticle; spores broadly obovate, $\cdot 0008$ long, with a minute nucleus.

475. **Melanconium varium.** *B. & C.*—Pustulis liberis elevatis subtruncatis; sporis oblongis. On dead twigs. New England. Sprague. No. 5819.

Pustules free, somewhat truncate above; spores oblong, $\cdot 00016$ long, sometimes slightly curved.

SORBY'S RESEARCHES ON CHROMATOLOGY.

Mr. H. C. Sorby, F.R.S., has published, in the Proceedings of the Royal Society, some of the results of his examination of Algæ and other Cryptogamia, by spectrum-analysis. We quote the following:—

Connexion of the different Groups of Algæ.

Perhaps I cannot choose a better illustration than that furnished by the different groups of *Algæ*—the olive, the red, and the green. They contain at least twelve different colouring-matters, distributed very differently, in such a manner as to connect, and yet to distinguish, the different groups very characteristically. I have not yet made any accurate quantitative analyses, and therefore express

the relative amount of the various substances by the following signs :—

A relatively large quantity	*
A relatively moderate quantity	+
A relatively small quantity

	Olive.	Red.	Green.
Blue chlorophyll.....	+	+	*
Yellow chlorophyll.....			+
Chlorofucine	+	.	
Orange xanthophyll	+	+	+
Xanthophyll		+	+
Yellow xanthophyll			+
Fucoxanthine	*	.	
Lichnoxanthines.....	.	.	+
Phycocyan		+	
Pink phycocyan		*	
Red phycoerythrine		*	

On inspecting this table it will be seen that the olive *Algæ* are characterized by the relatively large amount of chlorofucine and fucoxanthine, and the total absence of yellow chlorophyll, of xanthophyll, and of yellow xanthophyll. The red are especially distinguished by the colouring matters of the phycocyan and phycoerythrine groups, but also differ from the olive in containing xanthophyll and very little chlorofucine and fucoxanthine. The green are characterized by the presence of yellow chlorophyll and yellow xanthophyll, as well as by the absence of chlorofucine, fucoxanthine, and the substances soluble in water, so characteristic of the red group. Blue chlorophyll, orange xanthophyll, and the lichnoxanthines are common to all. It will also be seen that the red group is intermediate between the olive and the green, and, independent of the red colouring-matters, it differs from each of the other groups far less than they do from one another. It is also still more closely connected with each by other examples. My endeavour has been to extend such a method of comparison to all the leading classes of plants and to some of the lower classes of animals, and to ascertain the order in which they should be arranged, so as, in like manner, to show the most gradual and unbroken passage from one to the other.

Connexion between the lowest classes of Animals and Plants.

Comparing these various groups of *Algæ* with other classes of plants, and with such low classes of animals as *Actinæ*, I found that the whole of the colouring-matters present in green *Algæ* are those most characteristic of all the higher plants, the only difference being that in certain circumstances these latter contain in addition various more or less accidental and unessential substances, belonging to the erythrophyll and chrysotannin groups, some kinds of

which, nevertheless, do to some extent appear characteristic of particular classes. As far as their constituent colouring-matters are concerned, the green *Algæ* are therefore perfectly typical plants. On the contrary the olive *Algæ* differ in a very marked manner; they contain no yellow chlorophyll, nor either of the two kinds of xanthophyll, all so characteristic of the most perfect plants, but contain chlorofucine and fucoxanthine, both of which occur in certain species of *Actiniæ*, like *Anthea cereus*, var. *smaragdina*. The presence of such colouring-matters, therefore, connects the olive *Algæ* with the lower classes of animals, in the same manner that the presence of blue chlorophyll connects some animals with plants. Such substances, though essential to the growth of plants, are not constant in closely allied species of animals, as though they were of no more importance for the life of animals than the accidental vegetable colouring-matters are for the life of plants. The value of these connexions between plants and animals remains to be determined, but in any case such definite facts must, I think, have some very important signification. If, then, according to these principles, the olive *Algæ* be looked upon as a link connecting the lowest classes of plants with some of the lowest classes of animals, there is a perfect and simple continuity; whereas if they were to be considered intermediate between green *Algæ* and the higher *Cryptogamia*, there would be two great breaks of chromatological continuity.

Changes occurring in Oscillatoria.

The olive *Algæ* are also connected in another manner with lichens, through *Oscillatoria*. These latter plants are extremely interesting, since they are subject to most remarkable changes, depending on the conditions in which they grow. I have made a series of quantitative analyses, which show this in a striking manner. I may here say that the chief difficulty in the analysis was the determination of the amount of the lichnoxanthines in presence of chlorofucine and fucoxanthine, and therefore the quantities given must be looked upon as only approximate, derived from several different methods, none of which were perfectly satisfactory, though they all agreed in leading to the same general conclusions. In discussing the results of the analyses, it was requisite to take the amount of blue chlorophyll as uniform, since it was the only constituent occurring in any considerable quantity throughout the whole series. To have taken equal weights of the plants themselves would have been almost impossible, and would often have made those which really correspond very closely appear to differ extremely, since the constitution of the endochrome is the important question. Of course by thus calculating the results as if the amount of chlorophyll were the same in all, there appears to be an increase in some of the other constituents in the specimens exposed to the sun, due, however, in reality to a reduction in the relative quantity of chlorophyll.

For comparison I give the following:—

I. *Fucus serratus* grown in the shade.

II. The same plant grown in the sun.

III. *Oscillatoria* grown under water, in a cold spring, in a very shady place.

IV. The same plant, in the same spring, where more exposed to light.

V. The same plant, growing in and on the surface of water, where fully exposed to direct sun.

VI. Probably a different species of *Oscillatoria*, growing on a damp wall, completely exposed to the sun.

VII. *Peltigera canina*, slightly shaded, and having much fructification.

VIII. The same plant, where much exposed to the sun.

		Blue chloro- phyll.	Chloro- fucine.	Phyco- xanthine.	Orange xantho- phyll.	Fuco- xanthine.	Lichno- xanthines.
<i>Fucus.</i>	I.	100	90	0	3	77	11
	II.	100	100	0	3½	100	14
<i>Oscillatoria.</i>	III.	100	13	0	1	51	6
	IV.	100	19	36	3	55	10
	V.	100	trace	67	25	11	9
	VI.	100	„	100	77	25	23
<i>Peltigera.</i>	VII.	100	„	27	32	0	32
	VIII.	100	„	54	100	0	100

In this Table are compared together the same or very similar plants growing in different conditions, as connected by the brackets, and also plants belonging even to different classes. On comparing together the amount of the different constituents of the same plants grown in less or more light, it will be seen that some of the differences are in perfect agreement with those already described; but the differences in the *Oscillatoria* are evidently not a mere change in equilibrium, due to the decomposing action of the light, and point unmistakably to a great difference in the constructive force of the plant, depending on increased light. There is a remarkable development of phycoxanthine and orange xanthophyll, and a great decrease in the amount of chlorofucine and fucoxanthine, and the result is that we have a change almost from the type of olive *Algæ* to that of certain lichens. When growing in a very shady place the colouring-matters soluble in bisulphide of carbon are all iden-

tical with those in *Fucus* and other olive *Algæ*, whereas when grown exposed to much sun there is a great reduction in the amount of those substances which are so characteristic of that group, and at the same time a great development of others which are almost or altogether absent from it, but occur in large quantity in, and are very characteristic of, such lichens as *Peltigera canina*. The olive *Algæ* are, however, distinguished from those *Oscillatoriæ* which approach them most closely by the absence of the phycocyanins; and though these occur in *Peltigera*, it is distinguished by the absence of fucoxanthine from those *Oscillatoriæ* which in other respects agree with it. We may also draw another important conclusion from the above facts. *Oscillatoriæ* approach most closely to the olive *Algæ* when their vegetative energy is the weakest, when so little light is present that they can only just keep alive. This seems to show that the colouring of olive *Algæ*, in some way or other, belongs to a lower type than that of the green *Algæ*, as indicated by other facts previously described.

General connexion of different classes of Plants.

The olive *Algæ* are thus connected with the lowest green plants by means of two different groups of the red *Algæ*, one leading gradually to the green *Algæ* through *Porphyra*, and the other to lichens through *Peltigera*. There is the same sudden break in both, where the phycocyan and phycoerythrin colours cease and yellow chlorophyll and yellow xanthophyll make their appearance—at least I have hitherto met with no good connecting links containing a small quantity of both instead of a normal amount of one or of the other; and if this be really a universal fact, it would seem to show that, in some way or other, the presence of the phycocyanins excludes yellow chlorophyll and yellow xanthophyll. Curiously enough this break does not occur between one great natural class and another, but in passing from those red *Algæ* which are so closely related to the green series as *Porphyra*, and from *Peltigera* to other lichens. So much remains to be learned of the details that it would be premature to put forward any general scheme with the expectation of its being finally adopted; but at the same time it may perhaps be well to express what is already known, if only as a guide for further research. Of course I refer simply to the distribution of the colouring-matters; and this could hardly be expected to depend upon, or accurately follow, the difference in the development of the reproductive organs; but, on the contrary, it seems to represent something special in the constitution of the plants, for which no name has hitherto been adopted, but which I have called *constructive energy*. If such be really the case, an arrangement founded on chromatological characters alone would by no means necessarily agree in every particular with a natural system founded on structural peculiarities. Taking into consideration the

various facts described above, the following arrangement expresses every thing so far known respecting the distribution of the different colouring-matters:—

Actiniæ.
Anthea cereus, var. *smaragdina*.
 Olive group of *Algæ*.
Red Algæ. *Oscillatoria*
Porphyra. *Peltigera.*
Green Algæ. *Lichens.*
Higher Cryptogamia.
Highest classes of plants.

The colouring-matters found in *Actiniæ* are very various, and it is only particular species that contain those found in *Algæ*. Lichens, as a whole, are characterized by a number of what may be called accidental constituents—such, at least, as occur in one species and not in another closely allied to it. Many of these are almost or quite colourless substances, which easily give rise to colouring-matters when treated with various reagents. This fact, combined with their partial distribution, is taken advantage of in studying lichens as a means for distinguishing closely connected species. Their more constant and apparently fundamental colouring-matters correspond with those found in the higher classes of plants, but differ considerably in relative proportion, the lichnoxanthines usually being relatively more abundant.

ON SOLORINA BISPORA.

By DR. J. STIRTON.

By way of reply to Mr. Crombie's note on *Solorina bispora* (Nyl), perhaps I may be permitted to state the considerations which have weighed and still weigh with me towards the retaining of it as a species.

Since detecting this lichen for the first time in 1871, on Ben Lawers, I have secured it on almost every mountain in Scotland that I have climbed of a greater elevation than 3000 feet. Accordingly, so far as my experience goes, it is more frequent than *S. saccata*, which is usually found, besides, at much lower elevations—a fact which, in my estimation, ought not to be wholly ignored in the question of specific distinction. In all these instances (four in number) the thecæ are 2-spored, without exception. Occasionally, it is true, a one spored theca may be seen, where the spore is larger than usual, viz., as in one specimen ($1 \times \cdot 054$ m.m.), but, as is well known, especially in the larger spored lichens, such a state is easily accounted for physiologically, although the converse does not hold true.

Again, in *S. saccata*, two-spored thecæ are occasionally though rarely seen in this country, mixed with the 4-spored, where such spores approach in configuration and, to a less extent, in size, those of *S. bispora*, but this fact, so far from militating against the specific value of the latter, is, in my opinion, decidedly in its favour, and is merely a counterpart of what (as we have stated) is seen in its own internal organization. In this way is explained what is described by Anzi, and distributed by him from time to time.

3rdly. *S. bispora* has not the slightest relationship to *S. limbata* in the way which Mr. Crombie indicates, inasmuch as the so-called collemoid parasite is not present in any of the examples. The thallus, on being moistened, certainly swells more than that of *S. saccata*, and the particular parts in the neighbourhood of the apothecia are more isidiose, both of which characters, although apparent enough as well as distinctive, cannot, by any stretch of imagination, be construed into having any affinity with a *Collema*; besides, the internal organization is entirely that of the genus, and, in all the Scotch specimens, the rest of the thallus is well developed, and continuous with the parts surrounding the apothecia.

I am inclined to give a different interpretation from Mr. Crombie of the occasional gelatinous appearance assumed by *S. saccata*, and it may be, by *S. bispora*, and one that does not imply the rather clumsy assumption of the superposition or invasion of either a *Collema* or a *Leptogium*. By the way, it is somewhat puzzling to see why he has pitched on *L. scotinum* as the parasite. *C. cheileum* is in every respect a better choice; perhaps, however, the cellular appearance of the epithallus has determined him to include samples from both genera.

Some time ago my attention was arrested by seeing in two *Stictinæ* from New Zealand pulpy patches of the central and older parts of their thalli. The microscope revealed the fact that the granula gonima had renewed their life, so to speak, and formed detached groups, which caused corresponding bulgings on the upper surface, while the rest of the thallus had a gelatinous appearance, as if the fibrous element (small in this section in comparison to the extent of the gonimal layer) had been nearly macerated out. In fact the whole presented very much the appearance of *Sol. limbata*, while the surrounding parts retained their original constitution. Why granula gonima, in contradistinction to true gonidia, should have, in favourable circumstances, this increased, or rather renewed activity, I cannot explain, but the fact is, nevertheless, indisputable, of which any one may convince himself by retaining and keeping moist for a time between glass slips, portions of the thallus of a *Pyrenopsis*, &c.

During the summer of this year, while at Killin, I noticed, as Mr. Crombie has done, a greater prevalence of the form *S. limbata*, and always with deeply urceolated and accordingly old apothecia, as if the life of the plant had been on the decline, while the generally

wet season had served to stimulate the conglomerated gonidial granules into renewed activity, and produced (along with the consequent maceration) the modified thallus in question.

Had time and space permitted, I should have liked to have enlarged somewhat more on this subject; meanwhile, I shall content myself with describing a genuine parasite on *S. bisporea*, viz:—

***Lecidea epiphorbia*, Stn.**—Apothecia resemble, externally and internally, those of *L. Parmeliarum*, except that the paraphyses are neither thickened nor darker coloured at their apices, the spores are colourless, or present in a few instances, a faint tinge of yellow, and the reaction on the gelatina hymenia by means of iodine, shows a deep vinous red without any preceding cærulescent tint, instead of being negative, as in *L. Parmeliarum*. This lichen bears the same relationship to *L. Parmeliarum* that *L. solitaria* does to *L. oxyspora*.

BRITISH FUNGI.

By the Editor.

(Continued from Page 176.)

The number of species of Fungi found in this country since the conclusion of our series of descriptions in the last volume of this Journal has rendered it incumbent upon us, in fulfilment of promise, to continue the descriptions of these additions as a supplement to the “Handbook of British Fungi.”

***Agaricus (Lepiota) granulatus*. Batsch. var. *Carcharias*. Fr.**

Pileus umbonate, clad with darker evanescent granules; stem sub-bulbous, and as well as the patent ring squamulose with granules; gills adnexed, white.—*Fries, Ep.*, p. 18. *Pers. Ic. Pict.*, t. 5, f. 1. *Smith, Journ. Bot.*, 1873, p. 335 = var. *incarnato-albida*. Fr. *Mon. Hym. Suec.*, p. 29.

On grass under old Scotch firs.

***Agaricus (Armillaria) aurantius*. Schæff.**

Pileus fleshy, convex then plane, obtuse, innato-squamulose, viscid; stem solid, equal, concolorous, guttate above, clad with orange scales, sub-annulate; gills adnexed with a tooth, crowded, white.—*Fries Epicr.*, p. 21. *Sys. Myc. i.*, 39. *Schæffer, Ic.* 27. *B. & Br. Ann. N.H.*, 1335.

In pine woods. Forres, N. B.

Varying a good deal in the nature and frequency of the scales.

***Agaricus (Clitocybe) tuba*. Fr.**

White, pileus fleshy, thin, convex, then plane, umbilicate, moist, shining with a whitish silky lustre, margin even; stem equal, soon hollow and compressed, naked above, gills attenuated and decurrent,

broad, much crowded, white, growing pallid.—*Fries Epicr.*, p. 72.
—*Smith, Journ. Bot.*, 1873, p. 336.

Amongst leaves. Epping Forest.

Agaricus (Clitocybe) ericetorum. *Fr.*

White, pileus fleshy, convex, then plane, or concave (sub-turbinate) smooth, shining when dry; stem stuffed, short, tough, smooth, attenuated downwards, gills decurrent, broad, connected by veins.—*Fries Epicr.*, 73. *B. & Br. Ann. N.H.*, 1338. *Bull*, t. 551, fig. 1.

On heathy places. Sept.

Pileus, 1-2 in. broad; stem 1 in. long, 2-3 lines thick.

Agaricus (Clitocybe) gangrænosus. *Fr.*

Pileus fleshy, convex, then plane, obtuse, at the first covered with white powder, then naked, variegated or virgate; stem solid, spongy, sub-bulbous, soft, striate; gills sub-decurrent, arcuate, crowded, dingy-white.—*Fries Epicr.* p. 56. *Batt. t.* 20, f. m. *Smith, Journ. Bot.* (1873), 355.

In woods. Street.

At length turning jet black.

Agaricus (Clitocybe) subinvolutus. *Sm.*

Pileus plane, fleshy; margin subinvolute; gills broad, decurrent; stem stuffed, sub-bulbous; whole plant cream-coloured, every part at length becoming spotted.—*Smith in Journ. Bot.* (1873), p. 336.

In woods, &c.

Always smaller than *A. geotrupus*, *Fr.*, with a stem one-third the length. It is, moreover, never umbonate, and the fruit is different.

Agaricus (Collybia) succineus. *Schæff.*

Pileus rather fleshy, convex, then expanded, at length somewhat depressed, even; stem fistulose (not rooting), pallid-rufous, quite smooth; gills obtusely adnexed, broad, rather thick, serrulate, somewhat distant, whitish.—*Schæff Icon.*, t. 45. *Fries Epicr.*, p. 91. *B. & Br. Ann. N.H.*, No. 1339.

Amongst grass. Coed Coch.

Stem 1-2 in. long, 1-2 in. thick; pileus 1 in. broad.

Agaricus (Collybia) aquosus. *Bull.*

Pileus rather fleshy, convex, then expanded, umbonate, scarcely changing, margin rather inflexed; stem fistulose, thin, equal, straight, rooting, smooth, even; gills nearly free, crowded, narrow, white.—*Bull t.* 12. *Fries Epicr.*, p. 92. *Sys. Myc. i.*, 125. *B. & Br. Ann. N. H.*, No. 1340.

Amongst moss. Coed Coch.

Agaricus (Collybia) tylicolor. *Fr.*

Pileus rather fleshy, convex, then plane, somewhat umbonate, even, smooth; stem fistulose, equal, even, pulverulent; gills free, distant, plane, greyish.—*Fries Epicr.*, 98. *Sys. Myc. i.*, 132. *B. & Br. Ann. N. H.*, No. 1341.

In woods. Coed Coch.

NEW DIATOMS.

The following New Species of Diatoms are described by Mr. F. KITTON, in the "Monthly Microscopical Journal," for Nov., 1873. Chiefly exotic.

Aulacodiscus superbus. *Kitt.*—Valve with a large central heptagonal depression, processes placed on the margins of the seven cuneate inflations. The heptagonal area marked with large hemispherical elevations, less conspicuous on the remainder of the valve, the surface of which (with the exception of a small central smooth space) is covered with distinct radiant moniliform striæ; striæ about 18 in $\cdot 001$ in.; diameter of valve $\cdot 0050$ in.; length of sides of heptagon, $\cdot 0033$ in. [M. M. J. pl. xxxviii., fig. 1.]

Clark's Cliff, Barbadoes.

Stictodiscus Crozierii. *Kitt.*—Valve with numerous irregularly undulating costæ, which become very delicate as they approach the centre, within a short distance of the margin they divide, the spaces between the costæ distinctly punctate, central puncta large, scattered, diameter of valve $\cdot 0064$ in. [M. M. J., pl. xxxviii., f. 2.]

Plentiful in a gathering made by Capt. Crozier, in the Mauritius. Rare in scrapings from a Haliotis shell, West Indies.

Isthmia? vitrea. *Kitt.*—Frustules trapezoidal, the opposite corners of the ends more or less produced, hyaline, valves oval or sub-orbicular. [M. M. J., pl. xxxviii., f. 3.]

Shell scrapings, Sandwich Islands. (R. M. Browne.)

Nitzschia ventricosa. *Palmer.*—Frustules linear, lanceolate; apices obtuse; valve with ventral margin convex; dorsum straight or slightly convex; apices very much produced, awn-like; keel sub-marginal, punctate, puncta reaching to the extremities of the awn-like ends; striæ faint, distant, about 13 in $\cdot 001$ in. [M. M. J. pl. xxxviii. f. 5.]

Hong Kong (Palmer). Rio de Janeiro and Bahia (Capt. Perry).

Nitzschia decora. *Kitt.*—Valve linear, elliptical, somewhat deeply constricted at the centre; ends subacute; keel marginal, punctate; length $\cdot 0055$ in.; striæ moniliform, distinct, about 36 in $\cdot 001$ in. [M. M. J., pl. xxxviii. f. 6.]

Bahia (Capt. Perry).

Tryblionella conspicua. *Kitt.*—Valve elliptical, with central constriction, ends broadly rounded; one of the margins punctate, puncta conspicuous, about 12 in $\cdot 001$ in.; centre of valve with a longitudinal elevation gradually sloping towards the margins; striæ obsolete. [M. M. J., pl. xxxviii. f. 7.]

Scrapings from Tredacua shells, West Indies.

SPHAGNUM MOLLE.

Dr. R. Braithwaite has recently described, and figured in the "Monthly Microscopical Journal" this species as an addition to the British Flora, and to this communication we must refer for the full synonymy and bibliography of the species.

Sphagnum molle. *Sullivant.*—Monoicous; in very soft densely cushioned tufts; whitish-green above, pale brownish below. Stem pale-green, slender, 2-5 in. high, usually divided, with 2-3 layers of non-porose cortical cells. Branches densely crowded, 2-3 in a fascicle, nearly alike, erecto-patent, the porose cortical cells elongated, with the apices somewhat recurved. Cauline leaves very large, closely set, minutely auricled, ovato-spatulate, patent and deflexed, the hyaline cells almost free from fibres; apex with three teeth and a few minute ones at sides; margin involute, very narrowly bordered. Ramuline leaves oblong ovate, concave, convolute above, very narrowly margined, the apex truncate and with 5 or 6 irregular teeth; hyaline cells angulato-fusiform, very prominent and confluent at the back, with annular and spiral fibres, and a few large pores; chlorophyll cells slender, triangular, projecting between the hyaline at the concave surface of the leaf.

Male amentula short, thick, violaceous, placed in the coma, the bracts oblong, obtuse. Capsules in the capitulum or upper fascicles, perichaetium not separating, upper bracts broadly oblong-ovate, convolute with 2-3 teeth at apex, cells below elongate hexagono-rhomboid, above normal, free from fibres or pores. Spores ochraceous.

Var. β. Mulleri.—Ramuli 3-4 in a fascicle, 1-2 patulous, the rest longer, slender, and pendent. Stem leaves more elongated, the hyaline cells with fibres and pores; perichaetial bracts lanceolate, acuminate at apex, with a broad margin, wider toward apex, cells of upper part with fibres and pores.

Hab.—By moorland streams, forming dense hassocks. *Fr.* August.

The typical form is American, and the variety β only is found in Europe. In Britain, Darnholme, near Whitby, Yorks (Anderson, 1853, Crouch, 1871). Ben Lawers (Mac Kinlay), Brickhill Heath, Bucks (Rev. J. F. Crouch).

Fuller particulars, with plate xl., will be found in the "Monthly Microscopical Journal," vol. x. for November, 1873.

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Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY
AND ITS LITERATURE.

BRITISH FUNGI.

By the EDITOR.

(Continued from Page 109.)

Agaricus (Tricholoma) macrocephalus. *Schulzer.*

Sub-gregarious, very large; stem solid, ventricose, delicately granulated, whitish, ochraceous below, produced into a fleshy root; pileus compact, fleshy, convex then plane, somewhat depressed; cuticle at first smooth, at length broken up in a tessellated manner, ochraceous, darker when old; gills deeply emarginate, nearly free, attenuated behind, scarcely crowded, pallid.—*Schulzer, Icon. Hym. Hung., t. 3. Smith, Jour. Bot. (1873), p. 336.*

In grassy places. King's Lynn.

Very large, emulating *Ag. colossus*. Odour very powerful, like *Lilium auratum*; stem long, subterranean; flesh firm, slightly yellowish; taste unpleasant; spores irregularly globose, .006 m.m.

Agaricus (Omphalia) Fibula. *Bull. (Handbook No. 227.) Var. Swartzii. Fr.*

Rather firm; pileus at length nearly plane, whitish; disc tawny; stem whitish, slightly violet-coloured above.—*Fries, Mon. Hym. Succ., i., p. 193. Smith, Journ. Bot. (1873), p. 336.*

In woody places. Crystal Palace.

Agaricus (Entoloma) Saundersii. *Fr.*

(*Grevillea, ii., p. 63.*)

Growing on the ground in patches.

Agaricus (Entoloma) Wynnei. *B. & Br.*

Pileus at first plane, fuliginous, velvety, then convex, squamulose, hygrophanous; margin striate, often undulating; stem fuliginous, blue, compressed; base cottony; gills broad, transversely ribbed, pallid, margin crenulate; having the odour of bugs.—*Ann. Nat. Hist., No. 1342.*

In fir woods. Coed Coch. Sept.

Allied to *Ag. costatus*, with which it agrees in size.

Agaricus (Nolanea) mammosus. *L.*

Pileus sub-membranaceous, conical or campanulate, papillate, striate, hygrophanous, when dry isabelline, silky; stem fistulose,

rigid, polished, even, smooth, sprinkled, above with white meal; gills fixed, seceding, rather crowded, grey.—*Linn. Suec.*, No. 1218. *Fries, Epicr.*, 156. *B. & Br. Ann. N. H.*, No. 1343. *Bull.*, t. 526. *Batsch*, fig. 5.

On lawns. Coed Coch. Sept.

Pileus tawny; stem elongated, fragile.

Agaricus (Nolanea) icterinus. Fr.

Pileus sub-membranaceous, campanulate, then convex, papillate, striate, hygrophanous; stem somewhat stuffed, short, rigid, between flocculose and farinaceous; gills adfixed, or free, distant, ventricose, pallid.—*Fries, Sys. Myc.*, p. 207. *Fries, Epicr.*, p. 157. *Sm.*, in *Journ. Bot.*, 1873, p. 384.

In woods, &c., near Hereford. Oct.

Colour yellowish, or greenish yellow.

Agaricus (Pholiota) Arrhenii. Fr.

Pileus fleshy, thin, campanulate, expanded, smooth; stem fistulose, rigid, fibrous or strigose, and cracking, pallid above, ring entire, distant; gills adnate, then seceding, ventricose, narrow behind, becoming yellowish.—*Fries, Epicr.*, p. 161. *Smith, Journ. Bot.*, 1873, p. 336.

In a wood yard among chips. N. Wootton.

A totally different plant from *A. mycenoides*. Slender. Stem 3-4 in. long, $1\frac{1}{2}$ in. thick; pileus $1\frac{1}{2}$ in. broad.

Agaricus (Hebeloma) relicinus. Fr.

Pileus fleshy, thin, conical, then expanded, obtuse, squarrose with tomentose scales; stem solid, soft, equal, floccoso-squamose; gills adnexed, crowded, yellow, then olivaceous.—*Fries, Epicr.*, 171. *Sys. Myc. i.*, 256. *B. & Br. Ann. N. H.*, 1344.

Under pines. Stannage Park.

Colour fuliginous, without any perceptible odour.

Agaricus (Hebeloma) Clarkii. B. & Br.

Pileus campanulate, white, silky; stem nearly equal, flocculose, stuffed; gills adnexed, white, marginate.—*Ann. Nat. Hist.*, No. 1345.

In shady places. Street. Oct., 1871.

Allied to *A. sindonius*. Pileus $\frac{2}{3}$ in. across, 1 in. high; stem $1\frac{1}{2}$ in. high, 2 lines thick; slightly incrassated at the base.

Agaricus (Hebeloma) truncatus. Fr.

Pileus compact, convex, then plane, undulated, or flexuose, smooth, rather dry; stem solid, stout, equal, entirely pruinose with white; gills emarginate or free, crowded, dry, whitish, then flesh-coloured, at length ferruginous.—*Fries, Epicr.*, p. 181. *Schæff.*, *Icon.*, t. 251. *B. & Br. Ann. N. H.*, 1346.

On the grassy base of a bank. Dangstein. Sept.

Pileus $1\frac{1}{2}$ -2 in. across, plane, rigid, slightly viscid, rufous, depressed in the centre, smooth, margin crisped, inflexed, the extreme edge pruinose; stem $2\frac{1}{2}$ in. high, $\frac{3}{4}$ thick, claviform at the base,

stuffed, fibrilloso-striate, pale, rufous, less deeply coloured below ; gills narrow, adnexed with a tooth. Smell raphanoid.

Agaricus (Flammula) astragalinus. *Fr.*

Pileus fleshy, convex, then plane, discoid, at first silky about the margin, stem nearly hollow, flexuous, fibrillose or scaly, pallid ; gills adnate, crowded, pallid, then yellow, at length ferruginous.—*Fries, Sys. Myc. p. 251. Weinm. p. 209. Fries, Epicr., p. 187. Smith, Journ. Bot., 1873, p. 336.*

On pine stumps. Aviemore, N. B.

Taste nauseous and disagreeable, like *A. melleus*. A most beautiful species, resembling in colouring *Cortinarius cinnabarinus*.

Agaricus (Flammula) inauratus. *Smith.*

Pileus fleshy, 1 in. or more across, moist, smooth, furnished with a distinct veil ; gills broad, adnate, with a decurrent tooth, pale yellowish clay colour, stem incurved, sub-hollow, clothed with innate scales ; taste mild, insipid ; whole plant sulphury-yellow.—*Sm. in Journ. Bot., 1873, p. 336.*

On willows. North Wootton (C. B. P.).

Allied to *A. flavidus* and *A. Junonius*.

Agaricus (Flammula) juncinus. *Smith.*

Pileus fleshy, $1\frac{1}{2}$ in. across, hemispherical, sulphury-yellow, with a rich brown disc ; veil none, gills broad, very thin, red-brown ; stem elongated, thin, 4 in. long, attenuated downwards, clothed with a few fibres ; taste nauseous and disagreeable, somewhat bitter.—*Sm. in Journ. Bot., 1873, p. 336.*

On dead bullrushes in an old clay pit. N. Wootton (C. B. P.).

Allied to *A. mixtus*.

Agaricus (Naucoria) pusiolus. *Fr.*

Pileus slightly fleshy, hemispherical, then expanded, obtuse, even, smooth, rather viscid ; stem fistulose, filiform, smooth, yellow, shining ; gills adnate, crowded, plane, pallid, then cinnamon.—*Fries, Sys. Myc., i., 264. Fries, Epicr., 196. Pers. Myc. Eur. No. 272, t. 25, f. 1. B. & Br. Ann. N. H., 1347.*

On the ground. West of England.

Stem 1 in. or more, rather viscid, lemon-yellow. Pileus 3 lin., tawny-yellow.

Agaricus (Naucoria) sobrius. *Fr.* (Handbook p. 130.) *Var. dispersus.* *B. & Br.*

Pileus convex, ochraceous, delicately punctulate ; margin furfuraceous ; stem incrassated above or equal, furfuraceous, fistulose ; ring appendiculate ; gills pallid, adnate, plane.—*B. & Br. Ann. N. H., 1348. Ag. dispersus, Pers.*

On lawns amongst short grass. July.

Pileus 3-4 lines across ; stem $\frac{3}{4}$ -1 in. high, 1 line thick ; margin of gills white.

Agaricus (Stropharia) Worthingtoni. *Fr.*

(*Grevillea, ii., p. 63.*)

In pastures.

Agaricus (Psalliota) inunctus. Fr.

Pileus fleshy, soft, even, smooth, subumbonate, clad with an evanescent livid purplish gluten, growing paler; stem soft, flexuose, white, silky fibrillose below the distant fugacious ring; gills adnate, ventricose, pale brown.—*Fries, Elen.*, p. 40. *Fries, Epicr.*, p. 219. *Buxb. Cent. iv.*, t. 4, f. *Saund. & Sm. Illust. t. 29. B. & Br. Ann. N. H.*, 1349.

In grassy places. Ely. Epping.

Agaricus (Psalliota) merdarius. Fr.

Pileus convex, then plane, obtuse, smooth, moist, hygrophanous; stem hollow, tough, short, flocculose, pallid when dry; ring torn, fugacious; gills adnate, broad, yellowish then umber.—*Fries, Sys. Myc. i.*, 291. *Fries, Epicr.*, p. 220. *Buxb. Cent. iv.*, t. 16, f. 2. *Saund. & Sm. Illus.*, pl. 25. *B. & Br. Ann. N. H.*, 1350.

In a grass field. Sibbertoft.

Cortinarius (Inoloma) traganus. Fr.

Pileus fleshy, obtuse, fibrillose with lilac fibrils, then becoming smooth and discoloured; stem bulbous, spongy, violaceous white, saffron yellow within; gills emarginate, thick, crenate, distant, at first ochraceous saffron colour.—*Fries, Sys. Myc. i.*, 217. *Schæff. Icon. t. 56. Fries, Epicr.*, p. 281. *Smith, Journ. Bot.* (1873), p. 336.

In pine woods. Forres.

Taste strong, not unpleasant, odour very powerful, like that of the larva of the goat-moth (*Cossus*.)

Cortinarius (Phlegmacium) triumphans. Fr.

Large, splendid; pileus fleshy, convex, then plane, obtuse, regular, when moist viscid, crystalline, yellow or ochraceous, when dry yellow, disc spotted with minute adpressed scales, or naked; margin even; stem solid, firm, ovate-bulbous at the base, attenuated upwards, striate, white, then yellowish, with tawny scales disposed in rings; veil partial; flesh compact, white; gills emarginate, crowded, with a decurrent tooth, whitish, then clay-coloured. *Fries, Mon. Hym.*, ii., p. 4. *B. & Br. Ann. N. H.*, No. 1350.* *C. sublanatus, Hussey, Myc. Illus.*

In moist woods. Oct.

Stem 3-5 in. long, $\frac{1}{2}$ in. and more thick. Pileus 3-5 in. broad. Gills 3 lin. broad.

Cortinarius (Phlegmacium) porphyropus. Fr.

Pileus fleshy, thin, even, virgate, viscid; stem stuffed, then hollow, thin, somewhat attenuated, flesh purplish when broken; gills emarginate, crowded, thin, violaceous-purple, at length cinnamon.—*Fries, Epicr.*, p. 271. *Fries, Mon. Hym.*, ii., p. 31. *B. & Br. Ann. N. H.*, No. 1351. *Alb. & Schw.*, p. 153.

In woods. Coed Coch. Oct.

Stem 2-4 in. long, 3 lin. thick, fragile, externally and internally violaceous, growing pale, then whitish. Pileus $1\frac{1}{2}$ -3 in. broad, livid yellowish or clay-coloured.

Cortinarius (Dermocybe) cinnabarinus. Fr.

Pileus fleshy, obtuse, silky, then smooth, shining, stem stuffed, short, fibrillose, vermilion-red, gills adnate, broad, rather distant, darker.—*Fries, Epicr.*, p. 287. *Fries, Mon. Hym.*, ii., 64. *B. & Br. Ann. N. H.*, No. 1352.

In beech woods. Street. Oct.

An elegant species. Stem $1\frac{1}{2}$ -2 in. long, 3-4 lin. thick; fibrillose or striate; pileus 2-3 in. broad, campanulate, then plane, silky, or obsoletely squamulose, vermilion, flesh firm, paler; gills adnate, subdecurrent; 3 lin. broad, connected by veins, edge unequal, darker.

Cortinarius (Dermocybe) orellanus. Fr.

Pileus fleshy, obtuse, umbonate, villososquamulose or fibrillose, tawny-orange, flesh similar, stem solid, firm, subequal, striate or fibrillose, tawny as well as the veil; gills adfixed, broad, rather distant, at length opaque.—*Fries, Epicr.*, p. 288. *Fries, Mon. Hym.*, ii., 66. *Smith, Journ. Bot.*, 288. *Bull, Champ.*, t. 598. *Var.*

In woods. Epping Forest, &c.

Cortinarius (Telamonia) helvolus. Fr.

Pileus rather fleshy, becoming plane, smooth, hygrophanous, ferruginous, then tawny, at length rimose, with an evanescent obtuse umbo; stem stuffed, attenuated, of the same colour, veil peronate silky, ending in a ferruginous annular zone; gills emarginate, thick, rather distant, opaque, tawny-cinnamon.—*Fr., Epicr.*, 296. *B. & Br. Ann. N. H.*, No. 1355. *Bull, t. 531, f. 1.* *Fries, Mon. Hym. ii.*, p. 85.

In woods. Coed Coch. Sept.

Pileus 2-3 in.; stem 2-3 in. long, 2-4 lin. thick.

Cortinarius (Telamonia) armillatus. Fr. (Handbook No. 526, except reference to Hussey.)

Fries, Mon. Hym. ii., 78. *B. & Br. Ann. N. H.*, No. 1354.

In woods. Coed Coch.

Cortinarius (Telamonia) hæmatochelis. Bull.

Pileus fleshy, thin, gibbous, silky-fibrillose, tawny or pallid, testaceous; stem solid, attenuated above, with a rufous zone below the middle; gills adnate, crowded, rather narrow, pale cinnamon.—*Bull, t. 527, fig. 1.* *Hussey, Myc. Illus.*, referred to *C. armillatus* in *Cooke, Handbook*, No. 526. *B. & Br. Ann. N. H.*, No. 1354. *Fries, Epicr.*, p. 302.

In woods. Coed Coch.

Cortinarius (Hygrocybe) decipiens. Fr.

Pileus somewhat membranaceous, conical, smooth, shining, bay-brown (or testaceous), then rather fleshy about the umbo, which is darker; stem sub-fistulose, equal, slender, covered with a separable pallid cuticle, internally somewhat testaceous; gills adnate, thin, rather crowded, testaceous, or ferruginous.—*Fries, Epicr.*, p. 312. *Pers. Syn.*, 298. *Fries, Sys. Myc. ii.*, 236. *B. & Br. Ann. N. H.*, No. 1356. *Hoffm. Icon. An.*, t. 9, f. 12.

In woods. Leigh Woods. Oct.

Hygrophorus pratensis. *Fr.* (Handbook No. 560.) *Var. Pallida.*
B. & Br.

Pileus infundibuliform, pallid; margin undulated, deflexed; stem dilated, fibrilloso-striate; gills distant, decurrent, branched, pallid.—*B. & Br. Ann. N. H., No. 1356.**

In grassy places. Coed Coch. Oct.

Var. Meisneriensis. *Fries, Mon. Hym. ii., 132.*

Cinereous, stem often white, pileus thinner, margin at length striate.—*Smith, Journ. Bot., 1873, 336.*

In grassy places. Largo, N.B.

Hygrophorus livido-albus. *Fr.*

Pileus fleshy, obtuse, even, smooth, viscid, livid, of one colour; margin naked; stem stuffed, equal, firm, nearly equal; gills thick, distinct, distant, white.—*Fries, Epicr., 324. Fl. Dan., t. 1904, f. 2. B. & Br. Ann. N. H., 1357.*

In woods. Street. Oct.

Hygrophorus Clarkii. *B. & Br.*

Fragile; pileus convex, sub-umbonate, livid, cinereous, viscid; margin even; stem concolorous, hollow; gills broad, distant, thick, adnate, white.—*B. & Br. Ann. N. H., 1358.*

In woods. Street. Oct.

Gills in large specimens nearly $\frac{1}{2}$ in. wide.

Hygrophorus fornicatus. *Fr.*

Pileus fleshy, thin, campanulate, then expanded, even, smooth, viscid, livid white, stem firm, equal, tough, smooth; gills sinuate, adnexed, ventricose, distant, white.—*Fries, Epicr., p. 327. Batt., p. 46, t. 21. W. G. Smi., in Jour. Bot., 1873, p. 384.*

In mossy places, near Hereford. Oct.

Pileus obsoletely umbonate, 1 in. broad, when broadly expanded nearly 2 in. broad. Stem 2-3 in. high, 4 lines thick.

Hygrophorus metapodius. *Fr.*

Pileus compact, convex, then expanded, obtuse, at first viscid, then squamulose, becoming tawny; stem solid, smooth, attenuated downwards; gills thick, distant, veined, white; arcuato-decurrent behind.—*Fries, Obs. ii., p. 110. Fr. Sys. Myc. ii., 109. Fr. Epicr., 328. Fr. Mon. Hym. ii., 135. B. & Br. Ann. N. H., 1359.*

In pastures. Street. Oct.

Stem 1-2 in. long, $\frac{1}{2}$ in. and more thick; pileus $1\frac{1}{2}$ -3 in. broad.

Hygrophorus Houghtoni. *B. & Br.*

Pileus convex, bright coloured, at length depressed in the centre, striate, tawny yellow as well as the stem, transversely undulate, very viscid; gills decurrent, thin, grey.—*B. & Br. Ann. N. H., 1360.*

Amongst grass. Preston, Salop. Oct.

Pileus $1\frac{1}{2}$ -2 in. across; stem 2 in. and more high, $\frac{1}{4}$ in. thick, sometimes tinged above with blue; odour foxy. The gelatinous coat is extremely thick, and at length separates and forms a cup in the centre.

Lactarius exsuccus. *Smith.*

Pileus clothed with adpressed down, fleshy, depressed, with an involute margin; gills decurrent, white, shaded with verdigris, connected by veins and forked; stem white, very short, clothed with adpressed down; whole plant rigid and brittle, milkless.—*Smith, Jour. Bot.*, 1873, p. 336. *Lact. vellereus* var. β . *exsuccus*.—*Fries, Sys. Myc. i.* p. 77. *Buxb. Cent. iv.*, t. 4.

In pine woods, &c.

Smith observes that this plant can no longer be considered a mere variety of *L. vellereus*. The fruit of the two plants, as well as the general habit is very different.

Lactarius minimus. *Smith*

Journ. Bot., 1873, p. 205, with figs.

In a small wood. Abergavenny. Oct., 1871.

Russula subfætens. *Smith.*

Pileus bullate, subviscid, disc fleshy, margin submembranaceous; gills thick, distant, and branched; stem not so stout as in *R. fætens*, smaller, odour somewhat disagreeable; taste slightly acrid.—*Smith, Journ. Bot.*, 1873, p. 337.

On the ground.

Smith observes that this is the plant referred to by Fries in *Sys. Myc.*, i., p. 58, as a variety of *R. fragilis*, but that plant has crowded, thin, and generally entire gills, whilst those of the present plant are thick, distant, and branched. It is much nearer *R. fætens*.

Nyctalis caliginosa. *Smith.*

Pileus very fleshy, white when dry, flocculoso-pruinose, when wet marked with colours (as in *Ag. butyraceus*); margin involute, slightly exceeding the gills, gills thick, branched, decurrent; stem solid, flocculoso-pruinose, base naked; odour and taste rank and disagreeable (like *Polyporus squamosus*). *Smith, Jour. Bot.*, 1873, p. 337.

Amongst earth and dead leaves. Highgate.

Closely allied to *N. parasitica*, but at once distinguished by its truly decurrent gills and other characters.

Marasmius terginus. *Fr.*

Inodorous. Pileus rather fleshy, convex, then plane, obtuse, shining, becoming whitish; stem fistulose, smooth above, shining, pallid, reddish below, villous and rooting; gills seceding, then free, rather crowded, narrow, pallid.—*Fries, Sys. Myc.*, ii., 128. *Fries, Epicr.*, p. 377. *B. & Br. Ann. N. H.*, 1361.

Amongst leaves in a wood. Batheaston. Nov.

Pileus $\frac{5}{12}$ in. broad, faintly striate, of a pale reddish brown, darker in the centre; stem about 3 in. high, $\frac{1}{2}$ line thick, smooth, pale-brown, satiny; gills reddish-ochre, adnate by a tooth, but sinuated, moderately distant.

DIE DEUTSCHEN SORDARIEN.*

Those who have followed the vicissitudes through which the species and genera of ascomycetous fungi have passed, during the last few years, will welcome this monograph, if it be only because, in it they find, a series of plants grouped together which previously were scattered over several genera. It is not purposed to discuss the advisability or otherwise of accepting the genus *Sordaria*, suffice it to say that we have here, a number of species possessing many characters in common beside that of their general fimicolous origin, and that they are arranged in a systematic manner, so that in reality it matters but little, whether they be collectively called *Sphæria* or *Sordaria*. The author includes 22 species in this enumeration, which previously were scattered over the following genera:—*Sphæria*, *Podospora*, *Malinvernia*, *Hypocopra* *Coprolepa*, *Sordaria*, and *Ixodiopsis*.

The work commences with a history of the literature of the subject, from which it appears that the first author to mention a *Sordaria* was Persoon in his "Synopsis," p. 64, where we find two varieties of *Sphæria fimeti* described. Herr Winter regards Sowerby's *Sphæria stercoraria* as a *Sporormia*. This we venture to think an error. The specimen of *S. stercoraria* in the Hookerian Herbarium at Kew possesses simple dark-brown sporidia,† and it was determined by Rev. M. J. Berkeley,‡ who had the opportunity of seeing Sowerby's original specimen. Césati and De Notaris were the first to employ the genus *Sordaria*, but since then almost every author has limited it in a different manner. The Morphology of this genus is treated of in some very interesting remarks, upon the Stroma, the Perithecia, and the Fructification.

The genus itself Herr Winter thus defines—

"Stroma suberoso crustaceum, vel plerumque nullum, perithecia membranacea, pellucida, asci cylindracei vel ampli, 4—128-spori, paraphysibus obvallati, sporidia continua non septata, opaco-nigrofusca."

Although usually found upon dung, it is added, these plants may grow upon other vegetable substances; one is described on wood, another on blotting-paper, and a third upon the lees of wine. The perithecia may be scattered, or crowded, superficial, immersed in the matrix, or imbedded in a stroma, of various shapes, membranaceous, and often diaphanous. The sporidia, simple, round or ovate, brown, opaque, surrounded or not by a gelatinous envelope, or appendiculated. The genus is for convenience divided into three subgenera—

1. *Coprolepa* = possessing a stroma.
2. *Hypocopra* = without any stroma, but having the sporidia involved in mucus.
3. *Eusordaria* = having appendiculated sporidia.

* "Die deutschen Sordarien," by George Winter, with 5 plates. Halle, 1873.

† F. Currey, "Linnean Transactions," xxiv., p. 318.

‡ F. Currey, "Linean Transactions," xxv., p. 254.

Appended is a list of the species, with their synonyms. Each species is fully described, and is accompanied by a figure of its fructification, and what we consider equally important, a sketch of the perithecia. The illustrations are original, and taken in most instances from authentic specimens in the author's extensive herbarium.

SORDARIA. *Winter.*

Subgenus COPROLEPA.

1. *Sordaria merdaria* (Fr.) Awd.
Syn. *Sphaeria merdaria*. Fr. *Hypocopra merdaria*. Fr. *Coprolepa merdaria*. Fekl.
2. *Sordaria equorum* (Fekl.) Winter.
Syn. *Hypoxydon equorum*. Fekl. (Fung. Rhen.) *Coprolepa equorum*. Fekl. (Symb. Myco.)
3. *Sordaria fimeti*. (Pers.) Winter.
Syn. *Sphaeria fimeti*. Pars.

Subgenus HYPOCOPRA.

4. *Sordaria macrospora*. Awd.
Syn. *Hypocopra stercoris*. Fekl.
5. *Sordaria Rabenhorstii*. Niessl.
6. *Sordaria fimicola*. (Rob.) Cés & De Not.
Syn. *Sphaeria equina*. Fekl. (Fung. Rhen.) *Hypocopra fimeti*. (Pers.) Fries. Fekl. *Hypocopra stercoraria*. Fekl. *Sordaria conferta*. Awd. *Sphaeria fimicola*. Rob.
7. *Sordaria papyricola*. Winter.
8. *Sordaria discospora*. Awd.
Syn. *Hypocopra discospora*. Fekl.
9. *Sordaria humana*. (Fekl.) Awd.
Syn. *Sphaeria humana*. Fekl. (Fung. Rhen.) *Hypocopra humana*. Fekl. (Symb. Micol.)
10. *Sordaria fermenti*. (Fekl.) Awd.
Syn. *Sphaeria fermenti*. Fekl. (Fung. Rhen.) *Hypocopra fermenti*. Fekl. (Symb.)
11. *Sordaria bombardioides*. Awd.
12. *Sordaria maxima*. Niessl.

Subgenus EUSORDARIA.

13. *Sordaria fimiseda*. Cés et De Not.
Syn. *Podospora fimicola*. Cés. *Cercophora fimiseda*. Fekl.
14. *Sordaria coprophila*. Cés et De Not.
Syn. *Sphaeria coprophila*. Fries. *Hypoxydon coprophila*. Fr. (S.V.S.) *Cercophora mirabilis*. Fekl.
15. *Sordaria lignicola*. Fekl.
16. *Sordaria decipiens*. Winter.
Syn. *Sordaria lancisperma*. Fekl. *Sordaria decipiens*. (Winter). Fekl.

17. *Sordaria pleiospora*. Winter.
Syn. *Sordaria Langei*. Fekl. *Sordaria pleispora* (Winter).
Fekl.
18. *Sordaria setosa*. Winter.
19. *Sordaria curvicolla*. Winter.
20. *Sordaria anserina* (Rabh.) Winter.
Syn. *Malinvernina anserina*. Rabh. *Hypocropa anserina*. Cés.
21. *Sordaria minuta*. Fekl.
Syn. *Sordaria tetraspora*. Winter.
22. *Sordaria curvula*. De Bary.
Syn. *Sphaeria fimiseda*. (De Not.) Fekl. (Fung. Rhen.)
Sordaria appendiculata. Awd. *Cercophora conica*. Fekl.
(Symb.) *Ixodiopsis fimicola*. Karst. *Schizothecium fimicolum*. Corda.
- Forma *coronata*. Winter.
Syn. *Malinvernina pauciseta*. Rabh. *Malinvernina breviseta*.
Fekl.
- Forma *aloides*. (Fekl.) Winter.
Syn. *Sordaria aloides*. Fekl.

CHARLES B. PLOWRIGHT.

King's Lynn.

LICHENOLOGICAL MEMORABILIA, No. 4.

By THE REV. W. A. LEIGHTON, B.A. Camb., F.L.S., F.B.S. Ed.

On the Gonidial-Zoospores of Lichens.

Much attention has been of late devoted, and is still devoted, to the subject of the Gonidia of Lichens. Two theories or opinions have sprung from these researches, which are respectively supported by great and learned savans. Those whose studies are chiefly physiological maintain that the filamentous tissue of the thallus of lichens is a fungus which grows parasitically on an alga, which it envelopes and carries on with it in its growth so as to constitute the gonidia. On the other hand, true lichenologists, whilst admitting the apparent similarity of gonidia to certain algæ, do not consider them as such, but as special organs of multiplication or propagation of lichens.

Without offering any opinion as to the merits or demerits of these two theories, the solution of the question certainly appears important, not only as regards lichenology, but botany generally, and, consequently, the least research which tends towards this end cannot but be regarded as interesting and instructive in a scientific point of view.

Five years ago Famintzin and Baranetzky published their discovery of the existence of zoospores which issued from the gonidia of *Physcia parietina*, (L.), but this fact has not been since verified

by others, and has been even wholly neglected and overlooked, and that with contempt, by many savans.

To determine what becomes of the zoospores after their issue from the gonidia, M. Woronine has during two successive years (1870-1871) carried on researches on the gonidia of *Physcia pulverulenta*, (Schreb.), and in a paper in the *Ann. des Sc. Nat.*, ser. 5. Bot., vol. xvi., p. 317, illustrated by tab. 14, has published the results.

M. Woronine freed the gonidia from the thallus of this lichen, and cultivated them on a stage of a microscope, and kept them moistened daily with pure water. At the end of five days he saw the nucleus and the great lateral vacuole found in every gonidium to disappear, and the entire contents of the gonidium become very finely granular, and transformed into a considerable number (thirty, forty, or more) of small, round, irregular protoplasmic bodies, which are the future zoospores. During this time the gonidia increased considerably in size, and on a certain part of their surface a small protuberance arose, indicating the point whence the zoospores would issue. When the zoospores were fully formed, this protuberance increased very quickly; the membrane of the gonidium became in that point thinner and thinner, and ultimately absorbed, and an aperture formed, from which issued the entire mass of zoospores surrounded with a very delicate membrane. This membrane quickly disappeared, and the freed zoospores dispersed themselves throughout the circumambient water.

These zoospores are oblong and fusiform in shape, generally more or less attenuated at one extremity, which is furnished with two cilia, by means of which they move about with great rapidity. At the end of five or six hours this movement ceased, and the zoospores lost their cilia, took a perfectly round form, became covered with a membrane, their contour more definite, and their size enlarged. In about three more days these small spherical bodies assumed a decided green tint, and in each of them a small but very distinct central nucleus was observed. In fact, these small spherical bodies assumed the form of small gonidia, precisely identical with those contained in the large gonidia. In four or five days more these young gonidia, obtained from the transformed zoospores, became enlarged in size, and eventually began to multiply themselves by the usual process of reiterated and successive division. During the following five or six days these young gonidia grew considerably, but ultimately perished, probably from deficiency of nutriment.

These experiments he repeated several times, and always with the same results, and he thence deduces that the zoospores produced from gonidia vegetating externally to the thallus, never produce either filament or hypha, but continually give existence to new colonies of young gonidia.

Such are the results of M. Woronine's researches, which appear to carry the previous researches of physiologists one step further, viz., in witnessing the conversion of the zoospores into gonidia again.

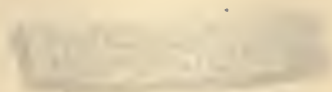
But now comes the question, what function do the zoospores exercise? We know that zoospores or spermatozoids do exist in ferns, mosses, hepaticæ, algæ, and probably fungi, and that they exercise in some—as yet unascertained—mode an influence in the fertilization and fecundation of the plant. Now, as the laws which the Divine Creator has imposed on organic matter are never excited into action but with some definite object, and the production of a definite result, we may conclude that these zoospores, issuing from the gonidia of lichens, exercise a definite function on these lichens. But what that action is remains to be ascertained by future experiments and researches. As yet we are simply in the dark. But will analogy justify us in judging it to be in some way connected with fecundation? Very possibly.

In Ann. des Sc. Nat. ser. 5, Bot. xv., p. 198, illustrated by tab. 8, M. Janczinski publishes a very interesting paper on the structure and development of *Ascobolus furfuraceus*, (Pers.), in which he shows that in the tubercular body formed on the mycelium, and which eventually develops into the cupula, there is engendered in the lower portion a series of larger cells assuming a curved, worm-like contour, which he terms *Scolécite*, and that from one only of the cells of this scolécite (possibly fertilized by zoospores) issue certain filamentary processes which progress upwards into the young hymenium, and there expand their extremities into young asci filled with protoplasm, which finally developed itself into perfect spores.

Now, though it be but jumping to a conclusion, still we may in some measure reason by analogy that as assumedly zoospores in other tribes tend to promote or further fecundation, which takes place in the early life of the plant, as in ferns, so also these zoospores in lichens do possibly fertilize, by their movements and contact, one or more gonidial cells, and that the gonidia so fertilized give birth to the asci and paraphyses of the hymenium. At all events, the matter is worthy of consideration, although it be *non proven*.

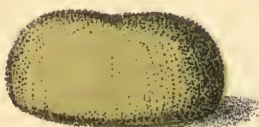
But then another question arises. If this be so, what are the spermogones and pycnides of lichens? and what their functions?

Pycnides are very rare, and are regarded generally by many as parasitic fungilli. More than one kind of spermogonium has been observed on the thallus of some lichens, and it is in such case difficult to say which is the true allied one. Nor have the contents of the spermogonium, the spermatia, been ever observed to exercise any fertilizing process on the apothecia, even in a young state, and moreover they also co-exist with the mature apothecia. Are, then, these spermogonia the male or fertilizing organs of lichens, or are they parasitic fungilli in an incipient or imperfect state, *i.e.*, having free spores not included in asci? And is fertilization not effected by them or their spermatia, but rather by the zoospores proceeding from the gonidia? Who will decide?





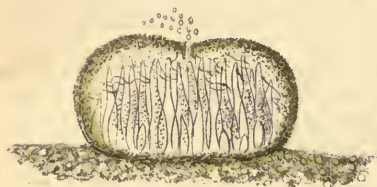
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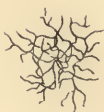
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THELOCARPON INTERMEDIELLUM. NYL
IN BRITAIN.

By W. PHILLIPS.

Thelocarpon intermediellum, Nyl. The following are the characters of this minute lichen, given by Dr. Nylander, in "Flora," 1865, p. 260. "Extus simile præcedenti (*Th. Laurerii*, Flot.), sed globuli paullo majores (diam. 0.2 millim.). Thecæ myriosporæ, sporæ oblongæ (long 0.0035-0.0050 millim., crass. 0.0020 millim.). Vulgo medio obsolete tenuiores et utroque apice obtuse incrassatulæ, paraphyses nullæ. Gelatina hymenea iodo vinose fulvescens, thecæ dilute cærulescentes."

"Ad lignum alni putrescens in Finlandia media (Novvlin)."

"A *Th. Laureii* differt magnitudine paullo majore, sporis aliis et defectu paraphysium. Adsunt filamenta ostiolaria brevia gracilia fasciculata in suprema parte cavitatis perithecii (omnino sterigmata simulantia spermogonii)."

To this I would add the following details from our British specimens:—

Thallus thin, yellowish-green, but evanescent. *Apothecia* scattered, occasionally crowded or adnexed, yellowish-green, small, globoso-depressed and umbilicate, when mature pierced with a minute pore (*fig. d.*). In a careful section under the microscope, I saw the spores escaping by the pore with a jerking motion. The *perithecium* is externally crustaceous in texture, and very firm, preferring to divide at the base when crushed, and so allowing the asci to escape downwards. The inner walls of the perithecium are clothed with minute branched threads (*fig. g*), which I take to be the "filamenta ostiolaria" of Dr. Nylander, but which are not confined to the immediate vicinity of the ostium. The *asci*, when perfect, are large, ventricose, attenuated in the upper part, and also at the base, and have innumerable sporidia (*fig. e*). They adhere so firmly to the hymenium, that if a group be pressed they spread in a radiate manner from a common centre, when the young asci can be seen in all stages of growth—bluntly clavate, cylindrical, fusiform, and as above described. The *sporidia* (*fig. h*), are very minute (0.0035-0.0050 × 0.0020 millim., Nyl.) oblong, hyaline, obtuse at the ends, appearing to have a septum in the middle, but only apparently so, being in reality as described by Nylander, thinner in the middle portion and thickened at the apices. There are no *paraphyses*, a character which distinguishes this from the other species of the genus.

I have tried in vain to obtain the blue reaction with iodine in the asci, which Dr. Nylander has observed in this species, and can offer no reason for my want of success, as I use a solution strictly according with his formula. The only reaction I see is the "vinosofulvescent" colour assumed by the asci, as the result of their large

absorption of the solution, which indeed can hardly be called a *reaction*, being merely an instance of mechanical *mixture*.

This rare and interesting lichen, which has been hitherto found in Finland only, occurred near Shrewsbury, Dec., 1873, on the surface of old leather—the sole of a shoe—lying exposed in a fallow field. On showing it to my friend, the Rev. W. A. Leighton, he at once recognised it as *T. intermediellum* of Nylander, and afforded me every facility for comparing it with other species in his valuable herbarium. The fact will be known to British Lichenists that we owe to Mr. Leighton the discovery in this country of the only two species as yet recorded in our Flora, namely—*T. Laureri* (Flot.), and *T. epithallinum*, Leight., out of the nine species at present known in the genus. I am much gratified to be able to add *T. intermediellum*, Nyl., to the list of British species.

EXPLANATION OF PLATE XXI.

- a. *Thelocarpon intermediellum*, Nyl. Nat. size.
- b. Apothecium side view, much enlarged.
- c. Upper surface of the same.
- d. Section of the same with asci *in situ*, sporidia escaping by the pore.
- e. Asci filled with sporidia, others immature.
- f.g. Filaments growing from the sides of the interior of the perithecium.
- h. Sporidia much enlarged.

FRUITING OF MASTIGONEMA.

Dr. Wood has described, in his new and interesting work on the Fresh Water Algæ of the United States, a new species of *Mastigonema*, which he calls *M. fertile*. His remarks upon this species are of interest to Algologists. He says—"I found this plant in a stagnant pool in 'Bear Meadows,' forming a filamentous, felty mass, with *Cedogonium echinatum* and other algæ. The variously curved and interlaced flexible filaments are always simple, and of uniform, or nearly uniform, diameter through their whole length; excepting that, in some instances, there are small, local, bulbous enlargements of the sheath. Though the ends of the filaments, in all the specimens I have seen, are abruptly truncate, it is very possible that in the young trichoma the apex is prolonged into a long hair, as in most of the *Mastigonema*. The inner filament is sometimes very distinctly articulated, often, however, it is not at all so. The sheaths are firm, not at all lamellati, and generally project beyond the inner trichoma. The spores are cylindrical, yellowish, with a pretty distinct, although very close coat. They are always enclosed in distinct cells, and are mostly several in a filament, placed at intervals in its length."

This is the first instance, at least that I know of, in which a species of this genus has been found in fruit, and it is interesting to note the resemblance of the spores to those of the more commonly

fruiting Rivalarias. At the same time the peculiar arrangement of the spores is remarkable, and if the other species of *Mastigonema* should be found to have the more common exclusively basal arrangement of spores, I think it would afford good ground for considering *M. fertile* as the type of a new genus. Moreover, the filaments are not united into a distinct thallus, and also want the apical hair of *Mastigothrix*, so that it is very probable that they represent an undescribed genus. Until, however, the fructification of the European species is elucidated, it seems best to forbear multiplying names.

HUNGARIAN FUNGI.

The species figured in the first part of the new work by Kalchbrenner, called "*Icones Selectæ Hymenomycetum Hungariæ*," are—

Ag. (<i>Amanita</i>) <i>aureola</i> . K.	Ag. (<i>Collybia</i>) <i>plumipes</i> . K.
Ag. (<i>Amanita</i>) <i>cygnea</i> . Sch.	Ag. (<i>Collybia</i>) <i>rancidus</i> . Fr.
Ag. (<i>Lepiota</i>) <i>nympharum</i> . K.	Ag. (<i>Mycæna</i>) <i>cæsiellus</i> . K.
Ag. (<i>Lepiota</i>) <i>Schulzeri</i> . Fr.	Ag. (<i>Omphalia</i>) <i>cyanophyllus</i> . Fr.
Ag. (<i>Tricholoma</i>) <i>macrocephalus</i> . Sch.	Ag. (<i>Omphalia</i>) <i>reclinis</i> . Fr.
Ag. (<i>Tricholoma</i>) <i>psammopus</i> . K.	Ag. (<i>Pleurotus</i>) <i>sapidus</i> . Sch.
Ag. (<i>Tricholoma</i>) <i>arcyrius</i> . K.	Ag. (<i>Pleurotus</i>) <i>pardaus</i> . Sch.
Ag. (<i>Tricholoma</i>) <i>centurio</i> . K.	Ag. (<i>Pleurotus</i>) <i>superbiens</i> . Sch.
Ag. (<i>Tricholoma</i>) <i>tumulosus</i> . K.	Ag. (<i>Annularia</i>) <i>Fenzlii</i> . Sch.
Ag. (<i>Clitocybe</i>) <i>trullæformis</i> . Fr.	Ag. (<i>Pluteus</i>) <i>patricius</i> . Sch.
Ag. (<i>Collybia</i>) <i>atramentosus</i> . K.	

The figures are well executed, and published at Pesth, by the Athenæum press.

TORTULA INCLINATA. H. & Gr.

In the last number of the "*Journal of Botany*," Mr. Henry Boswell gives the description of this moss, together with a plate, reproduced from the "*Bryologia Europæa*." It was recorded by him in 1872, as found in Oxfordshire, and he expresses surprise that it has not been met with elsewhere.

***Barbula inclinata*.** Schwg.—Dioicus; broadly tufted, tufts plane, condensed. Stem short or taller, densely leafy. Leaves elongato-linear, undulated in the margins, the nerve whitish on the back, excurrent into a mucro; the perichaetial longer, narrower, erect, with a looser areolation. Fruit stalk flexuose, often spirally twisted; capsule yellowish or fuscous, cernuous, oval-oblong, more or less incurved and gibbous at the base.

***Habitat*.**—Gravelly and sandy ground near river banks, or dry hills and subalpine calcareous situations. The short stems rarely attaining an inch in length, the shorter, broader, and less curving

leaves, and the shorter cernuous capsule, readily distinguish it from *B. tortuosa*. (*Schimp. Syn. p. 178.*)

For some further particulars, as well as for the analytical plate, we must refer Bryologists to the "Journal of Botany" for January, 1874.

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Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY
AND ITS LITERATURE.

ON THE SPECIES OF TIMMIA.

By S. O. LINDBERG, M.D.

[Translated, with the Author's permission, from "Öfversigt af K. Vetenskaps Akad. Förhandlingar," 1864, No. 6, by R. BRAITHWAITE, M.D., F.L.S.]

Timmia. HEDW.

Stirp. Crypt. i., p. 83 (1787).

1. **Timmia Austriaca.** HEDW.

Dioicous; yellowish above, not easily softened; with a tall dense-leaved stem; the leaves of equal length, solid, somewhat appressed when dry, from a rufescent sheathing base, erecto-patent, abruptly narrowly lanceolate, acute, rather obtuse at apex, plicate, serrate at back on the uppermost part of the nerve; bracts slightly shorter; seta slender, 2-3 inches long; capsule oval, horizontal, slightly striate, lid hemispherical mammillate, large; annulus rolling back; inner teeth whitish, without appendages; antheridia narrowly cylindric, with a short, thickened, bulb-like filament.

Timmia Austriaca. HEDW. Sp. Musc., p. 176, tab. 42, fig. 1-7 (1801).

T. polytrichoides. Var. β . *lutescens.* BRID. Sp. musc. III., p. 99 (1817).

T. lutescens. BRID. MSS. ex ejus Bryol. Univ. II., p. 72 (1827).

T. megapolitana (HAUD HEDW.) auct. antiqu., pp. Var. β , Hook et TAYL. Musc. Brit. 2nd edit., p. 191 (1827).

Mnium austriacum. P. BEAUV. Prodr., p. 74 (1805).

Habit. On rocks covered with earth in the mountain regions of Europe, up to the southern part of the island of Spitzbergen, but everywhere rare, and sparingly fruitful.

Female plant ferruginous below, yellowish above. Leaves rigid, straight, pellucid, when dry slightly incumbent or subarcuate, rather glossy, broad at base, channelled, above convolute-concave, with two longitudinal plaits, margin straight, never undulated,

unequally coarsely serrate, the nerve vanishing in the extreme apex; cells of base linear, upper quadrate, incrassate, almost empty; very minutely papillose on the upper part of back of leaf. Bracts of perichæmium longly sheathing. Vaginula longly and narrowly cylindric. Capsule sulcate when dry. Lid hemispherical or very shortly conical. Annulus broad, triple. Teeth of outer peristome rugulose at apex, and densely papillose, those of internal strongly papillulose. Spores rufous-yellow. Calyptra long, narrow, membranous, cleft above the middle, straw-coloured, brown at apex, quite smooth.

Male plants either forming separate tufts or growing in the same with the female, very like the female, but with the leaves patent divaricate. Andrœcium terminal, perforate from the growing point of the stem as in *Polytrichum* (sometimes eccentric); bracts very like the leaves, but patent; antheridia 6-10 times longer than the thickish filament, equalling the paraphyses.

Obs. This plant in habit is almost like *Polytrichum juniperinum* or *P. commune*, and is erroneously stated by authors to be monocious, for we have always found the male organs in separate plants.

2. *Timmia Bavariaca*. HESSLER.

Autoicous; green above, softened with great difficulty; with a rather tall dense-leaved stem; the leaves of equal length, solid, curling slightly when dry, from a scarce semi-vaginant yellowish base, whitish and glossy when dry, patenti-recurved, gradually lineari-lanceolate, very acute, scarcely plicate, the back of the nerve smooth; bracts slightly shorter; seta slender, about $1\frac{1}{2}$ inches long; capsule oval or elliptical horizontal, smooth; lid hemispherical, most frequently impressed at the centre, and mammillate; annulus rolling back; inner teeth pale yellow, spinuloso-appendiculate; antheridia cylindric, from somewhat shorter to one half longer than the longly obconical filament.

Hypnum foliis lanceolatis, falcatis, setis alaribus, capsula ovata, inclinata, operculo mammillari. HALLER, Hist., stirp. indig., Helv. III., p. 37, n. 1779 (1768).

Timmia polytrichoides. BRID. Musc. Rec. II., p. III., p. 153, pp. (1803).—*a. viridis.* BRID. Sp. Musc. III., p. 99, pp. (1817).

T. Bavarica. HESSLER de Timmia, p. 19, fig. 3 (1822). LAUR. in Regens. bot. Zeit. x., p. I., p. 295 (1827).

T. viridis. BRID. MSS. pp. ex ejus Bry. Univ. II., p. 70 (1827).

T. Megapolitana (haud HEDW.) BRID. Bry. Univ. II., p. 69 pp. HOOK. et TAYL. Musc. Brit. 2nd ed. Suppl. tab. 6 (1827)? GREV. Scott. Crypt. Fl., VI., tab. 326 (1828). BR. et SCH. Bry. Eur. fasc. 10, Monogr., p. 6, pp., tab. I. (1841). HARTM. Skand. Fl. 4th—8th edd. (1843-61). C. MÜLL. Synops. I., p. 189, pp. (1848). RABENH. Deutsch. Krypt. Fl. II., p. III., p. 232, pp. (1848). SCHIMP. Synops., p. 430, pp. (1860).—Var. *β. bavarica.* BRID. op. cit. p. 71. WALLR. Fl. Crypt. Germ., I., p. 234 (1831).

T. Austriaca. Var. *β, umbilicata.* HARTM. 2nd ed., p. 330 (1832).

Var. β , *alpina*. HARTM. op. cit. 3rd ed., II., p. 292 (1838)—var. γ , *bavarica*. HÜBEN. Musc. Germ. p. 514 (1833).

Var. β , *Salisburgensis*. Larger and taller, with leaves less dense, acute and recurved, their cells one half larger, less chlorophylliferous, subhyaline; bracts of andrœcium more shortly acuminate; antheridia twice longer than the filament. *Timmia salisburgensis*. HOPP. MSS. ex auct. LAUR., in op. cit., p. 295.

T. alpina. LAUR. In op. cit., p. 294? Var. β , *salisburgensis*. LAUR. In op. cit. p. 295.

T. austriaca. Var. β , *alpina*. HÜBEN. l. c.

Habit.—In the damp shady fissures and holes of stones and rocks in the mountain regions of Europe, as in Switzerland, Austria, Central Germany, and Scandinavia, often associated with *T. Austriaca*, this plant grows commonly, fruiting freely, but appears to prefer more elevated localities. Collected also in the peninsula of Kamtschatka by Tilesius. Var. β , has been observed in the Alps of Southern Europe.

Plants with the habit almost of *Polytrichum gracile*, or the small forms of *P. formosum*, ferrugineo-fuscos below, green above; leaves rigid, scarcely pellucid, opaque when dry, the base yellowish or pale brown, scarcely broader and appressed to stem, deeply channelled; the margin straight, often lightly undulate below, unequally coarsely serrate, nerve vanishing in the extreme apex, glossy when dry; cells of base linear, upper twice smaller than those of the preceding species, quadrate, slightly incrassate, quite filled with chlorophyl, very minutely papillose on the upper surface of the leaf, smooth on the back. Bracts of perichætium semi-vaginant, vaginula short, lanceolate-ovate; capsule horizontal or subnutant, sometimes very slightly oblique, striate when dry; annulus narrow, double; teeth of outer peristome strongly rugulose at apex, slightly papillose, those of the inner one nearly smooth; spores greenish; calyptra as in the preceding species; andrœcium axillary among the innermost bracts of the perichætium, often stipitate, its bracts about 16, very broad, unequally serrate, of lax texture, outer obtuse, suddenly longly acuminate, with the nerve disappearing in the acumen, inner more gradually acuminate; antheridia equalling the obconical filament, or one-half longer, equal to the paraphyses.

3. *Timmia Megapolitana*. HEDW.

Autoicous; pale green, very readily softened; stem short, distant leaved; leaves accrescent, fragile, curled when dry, from a scarcely semi-vaginant yellowish base, erecto-patent, gradually more narrowly lanceolate, rather obtuse, not plicate, with the back of the nerve smooth; bracts almost twice longer, linear-lanceolate, acute; seta stoutish, about an inch long; capsule obovate-oblong, oblique, cernuous, passing almost gradually into the seta, smooth; lid hemispherical, with the centre impressed and mammillate;

annulus persistent; internal teeth yellow, spinuloso-appendiculate; antheridia cylindric, with a very short indistinct filament.

Timmia megapolitana. HEDW. Stirp. crypt. i., p. 83, tab. 31 (but the bracts of perichæcium too short and broad), 1787, et Sp. musc., p. 176 (1801). TIMM. Fl. megapol., Prodr., p. 234 (1788). BRID., musc., recen. II., p. 1, tab. 4, fig. 32 (1798), et Bry. Univ. II., p. 69 pp. (1827). ROTH. Tent. Fl. Germ. III., p. 1, p. 254 (1800). WEB. et MOHR. Taschenb. pp. 254, 268-270 (1807). BLAND. in STURM, Deutsch. Fl. II., Heft 9 (1809). SCHWÆGR., Suppl. I., p. II., p. 84 (1816). HESSL. de Timmia, p. 16 (pp. ?), figs. 1 et 2 (1822). LAUR. in Regensb. Bot. Zeit. X p. I., p. 294 (1827). HOOK. in DRUM., musc. Amer. II., n. 273 (1828). WALLR. Fl., crypt. Germ. I., p. 234 (1831). HÜBEN. musc. Germ., p. 513 (1833). BR. et SCH., Bry. Eur. fasc. 10, Monog. p. 6 pp (1841). FIEDL. Synop. Laubm. Meckl., p. 74 (1844). C. MÜLL. Synop. I., p. 189 pp. (1848). RABENH. Deutschl. Krypt., Fl. II., p. III., p. 232 pp. (1848). SULL. in ASA GRAY, Man. Bot. U.S., 1st ed., p. 664 (1848), et 2nd ed., p. 642 (42): 1856. SCHIMP. Synops., p. 430 pp. (1860).

T. cucullata. MICHX. Fl. bor. Am. II., p. 304 (1803).

T. polytrichoides. BRID. Musc. rec. II., p. III., p. 153 pp. (1803)—*a. viridis*. BRID. Sp. musc. III., p. 99 pp. (1817).

T. viridis. BRID. MSS. pp. ex ejus Bry. Un. II., p. 70.

Mnium megapolitanum. GMEL. in L. Syst. Nat. 13th ed. II., p. II., p. 1327 (1791).

Mn. Timmia. HOFFM. Deutschl. Fl. II., p. 53 (1795).

Orthopyxis megapolitana. P. BEAUV. Prodr. p. 79 (1805).
Var. β , *norvegica*.

Taller; leaves when dry cirrhate-crispate, the lower most frequently fuscous-brown at base; the comal yellow-green, erect, lanceolate-linear with the base sometimes narrower.

Timmia norvegica. ZETTERST. in Ofvers. Vet. Akad. Förh. XIX., p. 364 (1862), et in Bull. Soc. Bot. France, 1862, p. 288.

Habit.—Wet turfy places among *Carices* and *Fissidentes*, near Malchin. First found by Timm in Mecklenburg-Schwerin. North America.

Var. β , in rocky grassy places in the subalpine region of Central Norway; at Tjidsjak in Lapland, and Rothwand in Bavaria; also Ben Lawers, Scotland.

Plant with the habit almost of *Atrichum undulatum*. Stem branched or simple, strongly radiculose below; leaves thickish, not pellucid, the base scarcely broader, and appressed to stem, channelled; the margin straight, often lightly undulate below, unequally coarsely serrate, the nerve vanishing in the extreme apex, and usually giving off fuscous radicles; cells of base linear, tuberculoso-papillose at back, the upper twice the size of those in the preceding species, rounded-quadrate, incrassate, almost empty, papillose on the upper surface. Bracts of perichæcium semi-

vaginant at the rather broader base; the upper surface of cells, especially on the nerve, strongly papillose, but on the back smooth, except on the uppermost part of the nerve. Vaginula very short, ovate. Capsule wide-mouthed (almost with the form of *Funaria calcarea*, WAHL. = *F. hibernica*, Hook), when dry slightly rugulose. Annulus narrow, simple. Teeth of internal peristome less appendiculate, otherwise quite smooth. Spores rufous-brown. Calyptra as in the preceding species.—Androecium axillary among the innermost bracts of the perichætium, stipitate; bracts 12, very broad, very shortly acute, unequally serrate, of lax texture, the nerve disappearing below the apex; antheridia shorter than the paraphyses, with the filament scarcely thickened.

Var. β , *norvegica*. Leaves, especially on the back of the base and on each surface of the nerve, with more elevated papillæ; cells twice larger, more empty, and subhyaline; comal leaves (bracts of perichætium?), with close and long articulated threads (paraphyses?) interposed, the cells one-half larger than those of the leaves, more chlorophyllose, and with more elevated papillæ. The plants hitherto have always been found sterile; nor are either male or female organs to be detected on any of my specimens.

BRITISH FUNGI.

By the EDITOR.

(Continued from Page 119.)

Boletus innunctus. *Krombh.*

Pileus pulvinate, depressed, fleshy, quite smooth, sub-umbilicate, pale cinnamon or yellowish brown, shining when dry, margin obtuse, tubes long, olive or greenish, free, orifice somewhat irregular, brownish, unequal, minute; stem obconic ochraceous above, finely reticulated, white and tomentose at the base, solid, flesh white, immutabile.—*Krombholz*, t. 76, f. 10, 11. *B. & Br. Ann. N. H.*, 1362.

Amongst moss. Ascot, &c.

Boletus sulfureus. *Fr.*

Pileus compact, convex then plane, silky or tomentose with innate flocci, stem firm, ventricose, even, smooth, sulphur coloured; tubes adnato-decurrent, short, minute, sulphur coloured, at length becoming greenish.—*Fries, Epicr.*, p. 413. *Smith, Journ. Bot.*, 1873, p. 337. *Fries. Mon. Hym. Succ.*, p. 249.

Amongst sawdust in dense clusters. Aviemore, N.B.

Closely resembles *B. pachypus* var. *amarus* in general aspect, but in reality different. Taste mild and pleasant, colour golden sulphur. Spores oval.

Boletus radicans. *Fr.*

Pileus pulvinate, when dry subtomentose, olivaceous-cinereous then ash colour, margin thin, involute, stem attenuated, rooting, even, yellow, flocculose with a reddish powder, darker where touched, tubes adnate, broad, unequal, lemon yellow.—*Fries, Epicr., p. 415. Smith, Journ. Bot., 1873, p. 337. Pers. Syn., 507. Fries, Sys. Myc., i., 390. Krombh., t. 48, f. 1-6.*

In woods. Staplehurst, Epping, &c.

Boletus pachypus. *Fries.* (Handbook, No. 718.) *var. amarus.* *Fr.*

Pileus becoming plane, even, growing pallid and whitish, stem nearly equal, scarcely reticulated, white.—*Fries, Epicr., p. 417. B. cyanescens, Cooke in Journ. Bot., vol. 3., t. 30. B. Elephantinus, Hussey, Illus.*

In grassy places.

Boletus cyanescens. *Bull.*

Pileus convexo-expanded, closely tomentose or floccose-scaly, opaque tan coloured, becoming brownish, flesh compact, white, dark blue when broken; stem stuffed with a spongy pith, then hollow, ventricose, villosa-pruinose, of the same colour, constricted above, even, white; tubes free, minute, round, white, then yellow.—*Bull, t. 369. B. & Br. Ann. N. H., 1363.* Saund. & Sm. Illus., t. 47. Barla., t. 37, f. 1-7. Fries, Epicr., 426.*

Meadows and woods. East Budleigh.

The floccose coating which encloses the whole plant when young is very curious. The degree in which the flesh becomes blue is variable.

Polyporus (Merisma) frondosus. *Fr.*

Very much branched, between fibrous and fleshy, rather tough; pileoli very numerous, dimidiate, rugose, lobed, intricately recurved, dingy grey, stems conerescent, pores small, acute, white.—*Fries, Sys. Myc. 355. Fr. Epic. p. 446. Rostk. t. 18. Fl. Dan. t. 952. B. & Br. Ann. N. H. 1364.*

In woods at base of trunks. Berkshire, Oct. [Esculent.]

Polyporus (Anodermei) mollis. *Fr.*

Pileus between fleshy and fibrous, soft, effuso-reflexed, somewhat triangular, acute, rugose, flesh coloured; pores unequal, elongated, flexuous, soft, white, when touched spotted with red.—*Fries, Sys. Myc. 360. Fr. Epic. 454. B. & Br. Ann. N. H., 1365.*

On rotten pine wood. Near Slough.

Polyporus (Placodermei) carneus. *Fr.*

Pileus woody, thin, hard, effuso-reflexed, rugose, smooth, not zoned, flesh-coloured, internally the same, pores minute, rounded, decurrent at the base.—*Nees Nova, Act. Nat. Cur., xiii. t. 3. Fries, Epicr., p. 471. B. & Br. Ann. N. H. 1366.*

On an old stump. Welshpool, Nov.

Dædalea mollis. *Sommf.*

Resupinate, determinate, submembranaceous, pallid, at length

becoming tawny, pubescent beneath, umber, pores irregular, sinuous and lacerated.—*Fries El.*, p. 71. *Fries, Epicr.*, p. 495. *Weinm. Russ.*, p. 345. *B. & Br. Ann. N. H.*, No. 1361.*

On alder and birch. King's Lynn (C. B. P.).

Hydnum compactum. *Fr.*

Pileus corky, compact, undulated or tuberculose, not zoned, olivaceous grey or tawny, commonly covered with a whitish tomentum, internally blue, variegated, stem very short, irregular, brownish or tawny, spines becoming tawny, pallid at the tips.—*Fr. Fpicr.*, 507. *B. & Br. Ann. N. H.*, 1367. *Krombh.*, t. 50, f. 12.

In heathy places Forres, N. B.

Hydnum aurantiacum. *A. & S.*

Pileus corky, compact, turbinate, or dilated; not zoned, orange, sometimes covered with a whitish down, internally zoned, stem short, orange, spines whitish, then tawny.—*Fr. Epicr.*, p. 508. *Alb. & Schw.*, p. 265. *Flor. Dan.*, t. 1439. *B. & Br. Ann. N. H.*, 1368.

In pine woods. Forres, N. B.

Hydnum ferrugineum. *Fr.*

Pileus between spongy and corky, soft, covered with a whitish tomentum, furrowed, dropping with blood-like tears, then more even, and internally ferruginous; stem unequal, spines tawny, becoming ferruginous.—*Fr. Sys. Myc.*, 403. *Fr., Epicr.*, 508. *Krombh.*, t. 50, f. 10, 11. *Bull.*, t. 409, var. *B. & Br. Ann. N. H.*, 1369.

In pine woods. Reading.

Hydnum cirrhatum. *P. (Grevillea, i., p. 115).* *B. & Br. Ann. N. H.* 1370.

On trunks. Epping.

At first snow white, but gradually acquiring a pale ochraceous tint; imbricated, confluent behind; aculei long; pileus rough, with abortive prickles.

Corticium lacunosum. *B. & Br.*

Soft, broadly effused; hypothallus woolly, tawny, lacunose; hymenium pulverulent.—*B. & Br. Ann. N. H.*, 1371.

On branches? Aboyne, Sept.

Spreading for several inches, and looking like a thin sponge from the numerous lacunæ.

Cyphella catilla. *Smith.*

Sub-membranaceous, expanded, margin crisped and undulated, hymenium veined, $\frac{3}{4}$ -in. broad, grey, often imbricated.—*Smith, Journ. Bot.*, 1873, 337.

On moss and dead leaves. King's Lynn (C. B. P.).

Allied to *C. galeata*.

Cyphella pallida. *B. & Br.*

Cups at first orbicular, at length irregularly lobed, plane, tomentose, or hairy, sessile; hymenium at length rugose, pallid,

ochraceous.—*B. & Br. Ann. N. H.*, 1372. *Rabh. Fung. Eur. Ex.* 1415.

On old stems of *Clematis vitalba*.

Cups $\frac{1}{4}$ –1 line across, sometimes proliferous. Differs from *C. Curreyi* in the colour of the hymenium, which is rugose, like that of *Cantharellus muscigenus* and its more irregular form. It appears also not to be erumpent as that species often is, but is seated on the bark of wood. Spores .00025–.00035 in. long, elliptic.

Cyphella dochmiospora. *B. & Br.*

Minute, pezizæform, snow white; spores oblique, ovate, slightly acute.—*B. & Br. Ann. N. H.*, 1373.

On sticks. (?) Batheaston, Oct.

Resembles externally *Peziza villosa*, but the hairs are not granulated. Spores .00035–.0006 in. long.

Clavaria rufa. *Fr.*

Cæspitose, rufous, clubs stuffed, incrassated, somewhat bifid, acute.—*Fries, Epicr.*, p. 577. *Flor. Dan.*, t. 775, f. 1.

In grassy places. Hereford (W. G. S.).

Clavaria curta. *Fr.*

Small, very much branched, crowded together, greenish yellow, no distinct stem, branches short, crowded, straight, obtuse; spores white.—*Fries, Vet. Ac. Förh.*, 1861. *Mon. Hym. Suec. ii.*, p. 281. *Smith in Journ. Bot.*, Dec., 1873.

In grassy places. Hereford (W. G. S.).

Approaches *C. fastigiata*, but different in stature and colour.

Dacrymyces macrosporus. *B. & Br.*

Gelatinous, tuberculate, rosy; flocci septate, apex sporiferous; primary spores oblong, 3–5 septate, articulations constricted; secondary spores elliptical, apiculate at either extremity; conidia concatenate.—*B. & Br. Ann. N. H.*, No. 1374, t. 7, f. 1.

On dead branches. Batheaston. Dec., Mar.

Forming irregular gyrate and tuberculated masses of a rosy colour, about $\frac{1}{4}$ in. long. parasitic on old *Diatrype stigma*. The mass of gelatine consists of delicate branched septate threads, mixed with shorter threads bearing oblong 3–5 septate primary spores .0015–.002 in. long, .00034–.0004 in. wide; these at length fall off, and produce shortly stipitate secondary spores, one from each division; secondary spores elliptic, .0005 in. long, more prominent on one side, pointed at either end. The cells of the primary spores are empty after the production of the secondary spores. Other threads break up into much branched chains of conidia .0002 in. diam. The parts of the gelatinous mass where these are produced acquire a paler tint. It preserves its rosy tint when dry.

Hydnangium carneum. *Wallr.*

Subglobose, irregular, smooth, flesh-coloured; cells pale flesh colour, immutable; basidia prominent; spores spherical, echinulate; spinules long, slightly coloured.—*Tulasne Hypogæi*, p. 75, t. 21, fig. 3.

About the roots of Eucalypti. Edinburgh (Dr. Dickson).
Sporidia .013-.014 m.m. diam.

Lycoperdon echinatum. Pers.

Peridium turbinate, substipitate, pale umber, or yellowish, rough with rather distant, stout, spiny warts; spores echinulate.—Pers. *Syn.*, p. 147. Pers. *Desp.*, p. 33. B. & Br., *Ann. N. H.*, 1375.

In woods. Berks.

Spores echinulate .0002-.00025 in. diam.

Scleroderma geaster. Fr. (*Grevillea*, i., p. 40).—B. & Br., *Ann. N. H.*, 1375.*

Spores .0003-.0005 in. diam.

Geaster saccatus. Fr. (*Grevillea*, ii., p. 77, t. xx.)

By hedge banks.

Perichæna quercina. Fr. (*Grevillea*, i., p. 40.)

External peridium crustaceous, becoming whitish; internal very thin, brownish-yellow, marked with impressed areolæ; flocci few; spores yellow, globose, rough.—B. & Br., *Ann. N. H.*, 1376.

On ash. Batheaston, Shrewsbury.

Spores .0005 in. diam.

Perichæna picea. B. & Br.

Peridium dark brown, hemispherical, at length circumscissile; spores sub-globose, tawny and even, as well as the flocci.—B. & Br. *Ann. N. H.*, 1377.

On dead wood. Shrewsbury.

Looks at first like a *Perisporium*. The colour of the spores approaches that of those in the section *Hyporhodii* of *Agaricus*.

Sphæronema æmulans. B. & Br.

Perithecia sub-globose, arising from a sparse mycelium, neck ciliate at the apex; spores very minute, with Brownian movements.—B. & Br. *Ann. N. H.*, 1378, t. 7, f. 2.

Epping Forest. Feb.

Perithecia .06 in. long; spores .0001-.0003 in. dia. Possibly a pycnidiferous state of some *Melanospora*.

Uromyces Behenis. Lev. (*Grevillea*, i., 102.)

On *Silene inflata*. Aug.

Puccinia Asteris. Eckl. (*Grevillea*, ii., p. 48.)

On *Aster tripolium*.

Puccinia Malvacearum. Corda.

Hypophyllous, sori scattered, hemispherical, at first veiled in the centre by the persistent epidermis, circumference naked, umbilicate beneath; spores densely crowded, ovoid-oblong, brown, even, somewhat constricted in the middle, obtusely acuminate, on very long hyaline pedicels.—Mont. *Syll.*, p. 314. Corda *Icones*, vi., p. 4, t. i., f. 12. *Grevillea*, ii., p. 47.

On mallow leaves. Australia. Chili.

Monosporium saccharinum. B. & Br.

Hyphasma gelatinous, coffee-coloured; flocci short, erect, sub-

clavate; spores obovate, fixed by the truncate base, pallid.—*B. & Br. Ann. N. H.*, No. 1379, t. 7, f. 3.

Growing on decayed substances under glass. Batheaston. Feb.

Spores .0004-.0005 in. long. Sometimes the tips of the threads have an articulation, and possibly form a second spore.

Helminthosporium exasperatum. *B. & Br.*

Flocci flexuous, nodulose above, fructiferous; spores oblong, obtuse at each end, triseptate.—*B. & Br. Ann. N. H.*, 1380, t. 7, f. 4.

On Sweet William. Sibbertoft.

Flocci knotted above, each knot bearing an oblong spore, .0012-.0018 in. long, .0004-.0005 in. wide.

Dactylium implexum. *B. & Br.*

Flocci erect, interwoven; spores nearly cylindrical, apiculate at the base, terminal.—*B. & Br. Ann. N. H.*, 1381, t. 7, f. 5.

On the inside of a willow. Hereford.

Spores .001-.0012 in. long.

Dactylium melleum. *B. & Br.*

Stratum thin, honey-coloured; flocci branched at the tips, branches bearing acute ramuli, with terminal uniseptate spores.—*B. & Br. Ann. N. H.*, 1382, t. 8, f. 6.

On decayed *Polyporus* or *Stereum*. Feb.

Spores .0005 in. long. Approaching *Diplocladium minus*, of Bonorden.

Dactylium Rennyi. *B. & Br.*

Flocci sparingly branched above, branches crowned at the tips with clavate ramuli; spores elliptical, uniseptate.—*B. & Br. Ann. N. H.*, 1383.

On stumps. Hereford.

Very near *Diplocladium minus*, Bonorden, but the spore-bearing ramuli are obtuse above, slightly clavate, and attenuated.

Peronospora ficariæ. *Tul.*

Fertile threads 5-6 times dichotomous, ultimate and penultimate, ramuli arcuate and deflexed, ultimate subulate, conidia broadly ellipsoid, obtuse, epispore pale, violet-tinted. Oospores having the epispore of a pallid yellowish-brown.—*Tulasne. Comptes Rendus*, Jan., 1854. *B. & Br. Ann. N. H.*, No. 1399. *De Bary, Ann. des Sci. Nat.*, 1863, xx., p. 117.

On *Ranunculus ficaria*. Forden. May.

Peronospora lamii. *De By.*

Fertile threads short, 5-7 times dichotomous, branches attenuated, patent, all more or less arcuate, ultimate ramuli acute, conidia distinctly pedicellate, globose-ovoid, obtuse, epispore pale dull violet tint; oospores small, brown.—*De Bary in Ann. des Sci. Nat.*, 1863, xx., p. 120. *B. & Br. Ann. N. H.*, No. 1400.

On *Lamium rubrum*. Forden. May.

Tufts dense, forming grey spots on the under surface of the leaves.

Peronospora hyoscyami. *De By.*

Fertile threads thick, 5-8 times dichotomous, branches patent, attenuated, straight or slightly curved, the ultimate forming a very obtuse angle, divergent, short, subulate, straight, acute; conidia small, ellipsoid, very obtuse, epispore pale violaceous.—*De Bary in Ann. des Sc. Nat.*, xx., p. 120 (1863). *B. & Br. Ann. N. H.*, No. 1401.

On common henbane. Market Deeping.

Verticellium agaricinum. *Bon.* (*Grevillea*, i., p. 184.)

On decayed Agarics.

[Plate 22, fig. 9. *a*, Upper portion of fertile thread. *b*, Spores. $\times 320$ diam.]

Verticillium aspergillus. *B. & Br.*

Flocci simple below, or rarely divided, attenuated above, repeatedly furcate at the tips.—*B. & Br.*, *Ann. N. H.*, 1384, t. 8, f. 7.

On decaying *Polyporus vaporarius*. Kelmarsh, Notts. Nov.

Threads $\cdot 0055$ in. high; spores $\cdot 0001$ in. long. The threads are occasionally divided below, in which case each branchlet is forked at the tip. The habit is that of *Chlonostachys araucaria*, Corda. It is worth enquiry whether this may not be a state of *Hypocrea farinosa*.

Polyactis galanthina. *B. & Br.*

Flocci above shortly branched, tawny; ramuli incrassated above; spores obovate, sessile; springing from elongated spicules.—*B. & Br.*, *Ann. N. H.*, 1385, t. 8, f. 8.

On bulbs of Snowdrop.

Spores $\cdot 0006$ – $\cdot 0007$ in. long.

Edocephalum roseum. *Cooke.* (*Grevillea*, i., p. 184.)

On old paper and rags.

[Plate 22, fig. 8. *a*, Fertile threads magnified. *b*, Spore further magnified.]

Oidium microspermum. *B. & Br.*

Pulvinules regular, ochraceous lemon-colour, flocci radiating, furcate; spores subglobose, concatenate.—*B. & Br.*, *Ann. N. H.*, 1387.

On bark of Scotch fir. Batheaston. Nov.

Spores $\cdot 0002$ in. dia. Differs altogether from *O. aureum* and *O. fulvum* in the shape and size of the spores. Pulvinules at length confluent.

Helicomycetes roseus *Link.*

Tufts effused, rosy.

Link Obs. i. 19. *Nees Sys.* 1., f. 37. *Link sp. i.*, 131. *B. & Br.*, *Ann.*, *N. H.*, No. 1386. *Fuckel Exs.*, No. 80.

On rotten trunks.

NEW BRITISH LICHENS.

Communicated by the REV. J. M. CROMBIE, F.L.S., &c.

The following *new species* of British Lichens have been recorded by Dr. Nylander, in the "Flora," for 1874, No. 1.

1. **Lecidea perobscura.** *Nyl.*—Thallus black, sub-opaque, thin, or very thin, effuse; apothecia concolorous, or brownish-black, slightly convex, immarginate, greyish within; spores 8næ, colourless, ellipsoid, small, 0,006-8 m.m. long, about 0,0035 m.m. thick, paraphyses not discrete, epithecium brownish-inspersed, hypothecium colourless; hymeneal gelatine bluish with iodine.

On old fir pales near Killin (Crombie, August, 1873), but sparingly gathered. This species seems allied to *L. uliginosa*, from which, however, it is sufficiently separated by the above characters.

2. **Lecidea spodiza.** *Nyl.*—Thallus dark-greyish, thin, sub-opaque, minutely granulated, or inspersed with greyish-green minute granules, K C + tawny-red; apothecia livid-grey or livid-pale, slightly convex, immarginate, colourless within; spores 8næ, oblong, 0,011-17 m.m. long, 0,0025-35 m.m. thick, frequently subcurved, and sometimes obsoletely or spuriously 1-septate, epithecium sordid, paraphyses not very well discrete, hypothecium colourless; hymeneal gelatine bluish with iodine.

On old fir pales about Killin (Crombie, August, 1873). Allied to *L. denigrata*, but distinct.

3. **Lecidea botryiza.** *Nyl.*—Thallus whitish-green, thin, minutely areolato-rimulose (thence appearing as if minutely appresso-squamulose), K—C—; apothecia brown, superficial, somewhat prominent, conglomerated and verrucose, dark within; spores 8næ, colourless, ellipsoid, simple, 0,006-9 m.m. long, 0,0035-45 m.m. thick, paraphyses not discrete, epithecium colourless, hypothecium brown; hymeneal gelatine tawny wine-red with iodine.

On micaceous rocks of Ben Voirlich (Dr. Stirton). Allied to *L. botryocarpa*, *Nyl.*, from which it is distinguished by the spores, hypothecium, and other characters.

4. **Lecidea caligans.** *Nyl.*—Thallus fuliginous-black, thin, rugose, diffract, indeterminate; apothecia blackish, plane, obtusely margined, within pale; spores thinly acicular, 0,030-35 m.m. long, 0,0015 m.m. thick; epithecium colourless, paraphyses not distinct, hypothecium colourless (perithecium somewhat brownish above), hymeneal gelatine wine-red with iodine.

On maritime rocks, in the island of Alderney (Larbalestier), very sparingly; allied to *L. egenula*, but a very distinct species.

5. **Arthonia astroidestera.** *Nyl.*—Nearly similar to *A. astroidea*, but having the apothecia more distinctly astroid, brownish, spores 3-5-septate, usually 4-septate, 0,021-26 m.m. long, 0,007-8 m.m. thick.

On the bark of holly, near Lyndhurst, New Forest (Crombie and Larbalestier), very sparingly. This species, which belongs to the section of *A. rubella*, = *A. armoricana*, Cromb. Enum. p. 103, Leight. Lich. Br. Fl., p. 401.

In addition to these, Nylander has also described another *new* British species in his Obs. Lich. Pyr. Or, p. 70, viz. :—

6. ***Pertusaria urceolaria***. *Nyl.*—Thallus whitish, thin, areolato-rimose, subpapilloso-exasperate, on the surface effuse, K + at first yellow, then orange-red; apothecia black, urceolato-depressed; spores 1-4næ, blackish, 0,100-0,140 m.m. long, 0,050-75 m.m. thick, K + violet.

On walls, La Moye, Jersey (Larbalestier, June, 1873). This interesting species is allied to *P. spilomantha*, *Nyl.*

A new subspecies is also recorded in the "Flora," *l. c.*, p. 16, viz. :—

Lecidea subincompta* oribata. *Nyl.*—Thallus greyish-brown, thinly subgranuloso-verrucose; spores 3-5 septate, 0,023-40 m.m. long, 0,003-4 m.m. thick.

On the ground, Ben Lawers (Dr. Stirton).

HUNGARIAN FUNGI.

In your notice of Messrs. Schulzer and Kalchbrenner's plates of Hungarian Fungi, p. 127, you particularize one plant as *Agaricus (annularia) Fenzlii*. Sch. This plant comes under my subgenus *Chamæota*, as originally published by me in the "Journal of Botany," vol. viii., p. 213, and where I refer *A. xanthogrammus*, *ces.* to it. Messrs. S. & K. must be aware that the mere *manuscript* name ("Mpt. p. 1079") of Schulzer's cannot, by any law of priority, stand, and it is the more inexcusable from the fact of Messrs. S. & K. actually referring to my remarks published under *Chamæota*. *Agaricus Fenzlii* must in future stand as *A. (Chamæota) Fenzlii*, and this becomes more important as the many new Agarics are day after day described from different parts of the world. Professor Fries also informs me that *A. macrocephalus*, Schulzer, has already been described by Lasch, No. 240.

WORTHINGTON G. SMITH.

AGUE PLANT.—American Botanists are of opinion that the plant found in marshes by Dr. Bartlett, and which is considered to be intimately associated with Ague, belongs to the genus *Botrydium* ("Grevillea," pl. 7.), the *Hygrogastrum*, of Rabenhorst.

THE AGUE PLANT.

Dr. Bartlett has recently read before the Chicago Society of Physicians and Surgeons a communication on the Ague Plant, already noticed by us ("Grevillea," vol. i., p. 95), and of which he has given the following more minute description :—

Safford's plant consists of body and what would appear to be a root. The body, or globe, consists of a wall enclosing a cavity. The layers of this wall are two; an internal structureless envelope of a dull white color, like the retina in the cadaver, and an outer green wall, apparently resting upon the first as a basement membrane, which is much more complicated. It is composed of a great number of green cells; these are circular, and enclose green contents. The contained material seems to be divided by lines running across the cell, which do not, however, display any definite arrangement. At this point of development the cells furnish the observer no indication as to the granular or cellular condition of their contents. When injured they appear to discharge other very small and greenish cells of a simpler construction. The green wall cells do not adhere very tenaciously to the white membrane. They are readily detached from the latter by gentle friction and maceration, and float off on to the root or other adjacent body. Of the construction of the cavity of the plant within the white membrane I have no knowledge. It seems to be a simple sac. The globe of the plant, at maturity, collapses, the upper circumference falling in upon the lower in such manner as to leave to the view a cup, in place of a sphere. At first glance it would seem that the upper hemisphere of the globe had been thrown off, and that the observer was looking into the concavity of the lower hemisphere. More careful examination will show that the globe has collapsed, its contents escaping, and the upper half of its wall falling down upon the lower. The collapsed plant generally presents the cell wall unbroken. Occasionally the upper depressed half is slit open through its centre; frequently, along the margins of the cup, at the junction of the depressed and stationary portions, there are lacerations of the wall. When the soil containing the plant is removed from its natural bed and placed in different conditions, the collapse of the globe seems to be precipitated. The walls, examined immediately after having fallen in, appear of a darker colour, as if moistened. The cavity of the plant contains a colorless fluid, which, it is presumed, is spontaneously evacuated when the globe collapses. It is forcibly ejected if the plant be punctured. I have never had an opportunity to examine it with a higher power than 200; I can therefore say nothing of its composition; it is probably simply nutritive. Under certain conditions, as when an attempt is made to preserve the plant in glycerine, the green wall, losing entirely its cellular character, becomes rumpled up, and massed upon the inner tunic.

The root, or what seems to serve as such, is, in length, about six times the diameter of the plant. The trunk of the root soon puts forth a number of branches which seem to terminate in points, the latter becoming bulbous when soaked, as in glycerine. The root is white and translucent; not smooth, but having an appearance as if the surface were covered with granules. It is hollow, the fluid sometimes seen within giving the shaft the appearance of a glass tube containing water. It seems continuous with, and similar in structure to, the white wall membrane; or rather, this membrane appears to be an expansion of the root material. Dr. Safford regards the cavity of the root and body as continuous; he thinks he has seen the green cells of the wall within the hollow of the root. I have never observed such an appearance. The green cells of the globe wall were often seen floating upon, under, and about the root, and massing together in its branches. In such specimens, however, it has been easy to recognize the fact that these cells have been washed from the body of the plant—the spot on the globe from which they have been removed being readily detected by the bald appearance of the denuded white membrane.

The plant varies greatly in size; perhaps the average diameter of the mature globe would measure $\frac{1}{20}$ of an inch. They are, of course, occasionally so small as not to be detected without a lens; the largest specimens measure $\frac{1}{4}$ of an inch. The cellular character of the green wall may be detected by a good lens, this coat appearing granular under such a power.

HERBARIUM MYCOLOGICUM ÆCONOMICUM.

The third fasciculus of this publication contains, amongst other fungi, the following interesting species:—*Puccinia straminis*, Fckl., placed side by side with the *Puccinia graminis* of Persoon. An interesting species of *Tillitia*; *T. lævis*, Kühn, for a full description of which see "Hedwigia," No. 10, 1873, p. 152-3, where we learn that Herr J. Kühn first detected this species in a sample of wheat from Lower Silesia; since 1867 he has cultivated it in the Botanic Garden at Hälle, and has been successful in reproducing it (by direct infection) upon numerous varieties of wheat. *Ustilago cramori*, Körnicke, on *Setaria Italica*, *Depazea betæcola*, D.C., on *B. cicla*, D. *brassicæcola*, D. *prunicola*, Op., on *Prunus domestica*, and *D. rubicola*, D.C., on the red currant. *Uromyces phaseolorum*, Tul., *Puccinia endiviæ*, Pass., *P. alii*, Cast., *Uromyces trigonellæ*, Pass., on *Fænumgræcum officinale*, *Peronospora Schachtii*, Fckl., on *Beta vulgaris*, *Sclerotium rhizodes*, Awd., on *Poa pratensis*, *Uredo pisi*, D.C., *Exoascus deformans*, Pass., on Peach leaves, *Asteroma viniperda*, Shm., on vine leaves, smaller branches, and grapes, *Cladosporium fumago*, Link., on gooseberry, hazel, and birch leaves,

Cæoma pinitorquum, A. Br. *Peridermium oblongisporium*, Fckl., *Hypoderma macrosporium*, R. Hartig., and *Trametes pini*, Fr., on various species of fir, *Uredo ovata*, Strauss, *U. vitellinæ*, D.C., *Rhizomorpha subterranea*, Pers., the mycelium of *Agaricus melleus*, *Saccharomyces Pasteurianus*, Rees, and *Botrytis Bassiana*, Bals., "Musccardine," on the pupæ of *Bombyx sericeum*, the silk-worm.
C. B. P.

CRYPTOGAMIC LITERATURE.

PHILIBERT, H. Observations sur l'hybridation dans les Mousses, in "Ann. des Sci. Nat.," 5 ser. (Bot.), t. xvii., p. 225.

JANCZEWSKI, E. Etudes anatomiques sur les Porphyra, in "Ann. des Sci. Nat.," 5 ser. (Bot.), t. xvii., p. 241.

TIEGHEM, P. VAN., and MONNIER, G. LE. Recherches sur les Mucorinees, in "Ann. des Sci. Nat.," 5 ser. (Bot.), t. xvii., p. 261.

TIEGHEM and LE MONNIER. Researches on the Mucorini; condensed translation, in "Quart. Jour. Micro. Science," vol. xiv., 1874.

LINDBERG, S. O. The Mosses of Buddle's Hortus Siccus, in "Journal of Botany," for February, 1874.

LUNDELL, P. M. The Desmidiaceæ of Sweden, in "Nova Acta Acad. Roy. Sci. Upsal.," vol. viii., fasc. 2, 1873.

KARSTEN, Dr. H. On the Theory of the Process of Fermentation, in "Annals of Nat. Hist.," No. 74, for Feb., 1874.

PECK, C. Descriptions of New Species of Fungi (North American), in "Bulletin of Buffalo Society of Natural Sciences," vol. i., No. 2, 1873.

BARTLETT, JNO., M.D. On a Marsh Plant (Ague Plant), supposed to be kindred to the Geniasma of Salisbury, in "Chicago Medical Journal," for Jan., 1874.

GERARD, W. R. New Species of Fungi (North American), in "Bulletin of Torrey Botanical Club," vol. iv., No. 12.

FAMINTZIN, A., and WORONIN, M. Ueber 2 neue formen von Schleimpilzen (*Ceratium*, A. & S.), 3 pl., in "Mem. de l'Acad. Imper. des Sc. de S'Petersburg," xx., No. 3.

MAGNUS, P. Zur Morphologie des Sphacelarieen, 4 pl., Berlin, 1873.

SAUTER, A. E. Florades Herzogthums Salzburg, v. die Flechten, vi. die Algen, in "Verlag. der Ges. für Salz.," xiii. band, 1873.

OUDEMANS, C. A. J. A. Materiaux pour la Flore Mycologique de la Hollande, ii., in "Archiv. Néerlandaises," t. viii., 1873.

HEGELMAIER, Dr. F. Ueber die Moosvegetation des Schwäbischen Jura, in "Württemb. Natur. Wissensch. Jahresheften," 1873.

REES, Prof. über die Flechtenfrage, in "Sitzung. der Phys. Med. Soc. zu Erlangen," Dec., 1873.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY
AND ITS LITERATURE.

NYLANDER ON THE ALGO-LICHEN HYPOTHESIS, AND ON THE NUTRITION OF LICHENS, &c.

Translated by the REV. J. M. CROMBIE, F.L.S., &c.

Dr. Nylander, in noticing in the "Flora," 1874, No. 4, two recent pamphlets by Dr. Weddell, makes the following very opportune observations on several most important matters relating to Lichenology, which with several additional notes, he has requested me to translate for insertion in "Grevillea." The pamphlets under review are:—

I.—H. A. Weddell, "Les Lichens du massif granitique de Ligugé" (Extrait du "Bulletin de la Société Botanique de France," 1873).

II.—H. A. Weddell, "Nouvelle Revue des Lichens du Jardin public de Blossac, à Poitiers" (Extrait des "Mémoires de la Société des Sciences Naturelles de Cherbourg," 1873).

Since what I have elsewhere written is true, "that truth itself consists in the continual demolition of errors," I have always believed that it tends very much to the interests of science to oppose fanciful or erroneous opinions; nay, it may legitimately be considered to be one's duty to point out and refute such opinions, for the progress of science depends not a little upon their subversion. Nothing, indeed, as is evident, is more readily received and propagated than erroneous opinions, and, consequently, there is so much greater difficulty in opposing their propagation, though we may not on that account depart from the duty.

The two writings, whose titles are given above, forsaking on certain points the truth and exactness of science, present a handle for some animadversions, of which the following are, I think, especially useful and opportune where they touch upon modern controversies.

I.

Here, in the first place, we find (p. 5) these words—"Recent observations introduce to our notice singular relations which exist between Lichens and Algæ," &c. From this it would appear that the author, in his own way, assents to the Schwendenerian hypo-

thesis. Those, however, who have promoted it have brought forward nothing confirmatory of it, but only anatomical reasons long ago well known (they have *introduced* nothing). The absurdity of such an hypothesis is evident from the very consideration that it cannot be the case that an organ (*gonidia*) should at the same time be a parasite on the body of which it exercises vital functions; for with equal propriety it might be contended that the liver or the spleen constitutes parasites of the *Mammiferæ*. Parasite existence is antonomous, living upon a foreign body, of which nature prohibits it from being at the same time an organ. This is an elementary axiom of general Physiology. But observation directly made teaches that the green matter originally arises within the primary chlorophyll—or phycocchrom—bearing cellule, and consequently is not intruded from any external quarter, nor arises in any way from any parasitism of any kind. This, in a note “Upon the Gonimic Evolution of the Collemacei” (“Flora,” 1868, p. 353), I have already enunciated, and in vain can it be denied. The cellule at first is observed to be empty, and then, by the aid of secretion, green matter is gradually produced in the cavity, and assumes a definite form. It can, therefore, be very easily and evidently demonstrated that the origin of green matter in Lichens is entirely the same as in other plants. What need is there then of any fuller refutation of the but too notorious hypothesis of Schwendener?

In a note under this paragraph, Nylander adds—“To those desiring somewhat longer explanations upon this subject, I may transcribe the following observations which I have elsewhere made:—‘In this place may be noticed the hypothesis, or singular conjecture, which, confirmed by no certain observations, and depending upon no valid grounds, amongst other statements, exhibits *Scytonemata* insinuating themselves into the thalli of *Pterygium* (erroneously termed *Pannaria* in Schwend. Erörter, in “Flora,” 1872, t. 4). Those *Scytonemata* are explained as ‘Algæ,’ which, in a most wonderful manner, are parasitic in *Pterygium*.” But did not the author in conceiving such a theory know that the *Scytonemata* are (as is proved by the genus *Gonionema*), rather Lichens than Algæ; so that he was by no means treating of the parasitism of an Algal on a Lichen, but of a Lichen on a Lichen. Moreover, the *Scytonemata* present a gonimic vagina much firmer than the Scytonemoid syngonimia of the *Pterygia*, and consequently the Schwendenerian assimilation is entirely erroneous. In opposition to the affirmation of this author, I may also add that no free *Scytonemata* are to be seen in the specimens cited as received from Tuckerman, and which I also have received. And if there were any truth in his seeing anything of the kind, we would reason from it that Lichens would grow best and occur most abundantly in places where *Scytonemata* and other “Algæ,” regarded as “parasitical” gonimic, or gonidial elements of Lichens, abound, and

would then be there observed crammed with these elements. The case, however, is far otherwise; for, on the contrary, such stations are avoided by Lichens, and are not inhabited, except sparingly by *Collema* and a few others, which are not always well developed; nor do those which occur contain any parasites of that kind in their texture. Elsewhere I have adduced that the gonidia and gonimia of Lichens constitute a normal organic system necessary, and of the greatest physiological importance, so that around them we behold the growing (or vegetative, if we may so term it) life chiefly promoted and active, as for example creating colorific matter. On the contrary, those portions of the thallus remote from the gonidia and more advanced in age, as best appears in incrassate crustaceous lichens, having lost their life, become entirely tartareous, forming, as it were, but "thickened deposits." Thus the life is collected chiefly in the parts around the gonidia (in the thin superficial stratum). Moreover the lower, and but little gonidiöse lichens, such as often occur amongst the *Thelotrema*, *Graphides*, *Verrucaria*, *Mycopora*, have but a shorter life, and consequently are frequently found with the apothecia either not rightly developed, or dead, and thus in this respect manifesting an analogy with and verging towards the fungi. It would be most inconsistent to admit that parasitic plants discharge the function of organs within the plant which they invade. Other and additional arguments against the parasitic hypothesis of Schwendener may be seen in Caspary, "Ueber, die neuen Ansichten in Betreff der Flechten, monach diese Schmarotzer seien in Schriften der physik. ökon. Gesellschaft in Königsberg, 1872, Abth. II., p. 18." I add nothing here concerning the hymeneal gonidimia, which, without any "hyphæ," and the hyphæ of fungi have certainly nothing common in structure with the "hyphæ" of lichens *, normally occupy the pyrenocarpous thalamia, which are destitute of paraphyses, between the thecæ of many species, and nothing of the *Iriadiads* or the gonimia of cephalaria, which similarly constitute normal organs, and afford constant characters of different species (not only in *Stereocaulon* and *Pilophoron*, but also in *Peltidea*, *Placopsis*, *Lecidea panæola*, &c.). It certainly seems superfluous to delay longer in refuting an hypothesis of that kind. But even though the gonidia of lichens should show an analogy with the gonidia of "Algæ" (and what is clearly known of the full development or fructification of those algæ treated of?), this circumstance would present nothing marvellous, and certainly would not confirm any subversive theories. But it is not to be overlooked, that under the name of Algæ are received by authors plants wholly ambiguous in their nature, and such, indeed, as are very near to

* Here the author adds in my copy—"The anatomical filamentose elements of lichens are distinguished by various characters from the hyphæ of fungi. They are firmer, elastic, and at once present themselves in the texture of lichens. On the other hand the hyphæ of fungi are very soft, they possess a thin wall, and are not at all gelatinous, while they are immediately dissolved by the application of hydrate of potash, &c."

lichens in a gonidic or gonimic respect. Nay, I have pointed out the presence of apothecia in true *Chroolepi* (constituting the thalli of *Verrucaria melathelia* and *Arthonia chroolepida*), and not a few thalli occur with chroolepoid gonidia of a violet scent (as for the first time I have shown in "Flora," 1870, p. 52). So far, then, are what are called "Algæ," according to the turbid hypothesis of Schwendener, and regarded as the "nourishers of the parasites of fungo-lichens," from constituting true algæ, that on the contrary it may be affirmed that they have a lichenose nature, whence it follows that these "algæ" (or more correctly pseudo-algæ) are in a systematic arrangement to be referred rather to the lichens, and that the class of algæ hitherto so vaguely limited, should be circumscribed by new and truer limits." Nyl., Obs., Pyr. Or., pp. 45-47. The boundary of lichens has also by my aid in this sense been enlarged, for to it I have annexed such genera as *Cora*, *Dichonema*, *Scytonema*, *Sirosiphon*. In "Hedwigia," 1852, p. 3, Cohn, in a paper on *Protococcus*, already indicates "the existence of zoospores, not only in the Algæ, but also in the lichens (developing themselves in their gonidia) as a possible thing." The origin of the Schwendenerian hypothesis seems to be as follows:—In Th. Fr. "Stereoc," p. 16, are mentioned, "Cephalodia composed of gelatinous fibres, intricately congested and blackish." I have shown that the author, led astray by his inexperience, took the common and widely-distributed *Sirosiphon saxicola*, Næg., which is to be found on so many different lichens, for the cephalodia of *Stereocaulon denuatum*. Then is devised the Friesian algo-lichen dispute. *Sirosiphon*, willing or unwilling, is intruded in the cephalodia. The gonimia of cephalodia become "parasite algæ," according to the discovery of the writer of Upsala. With respect to these, I have written in "Lich. Lapp. Or." p. 117, "If the various gonimia in cephalodia are to be assumed to be algæ, all gonidia must be declared to be such parasites;" which immediately afterwards Schwendener declared to be the case. But more recently Nörman (in an article on *Moriola*), has made known observations somewhat analogous, but much newer, more wonderful and worthy of attention—observations which so far from sustaining the hypothesis of Schwendener, on the contrary, quite weaken it.

On the same page of Dr. Weddell's paper already cited, we read—"It has been repeatedly stated that lichens live exclusively, or nearly exclusively, at the expense of the atmosphere; but it is apparent that the rain-water which periodically impregnates them, and which serves as a vehicle for many diverse substances, whether organic or mineral—substances which a crowd of accidental circumstances brings upon the localities—contributes at least an equal part of their nutrition." Also, p. 6—"It would be very difficult in many cases to explain without the concurrence of rain-water the presence, so general, of lime in the thallus of crustaceous lichens, which has without doubt penetrated in the condition of soluble carbonate." Whence does the author obtain such an exact know-

ledge of these, even in their proportions (an *equal* part)? I should certainly suppose that anyone teaching that lichens draw their nourishment from the atmosphere, by no means understands by the term "atmosphere" only dry air, but chiefly rain-water with all the different substances which it may contain and bring with it. Or who has affirmed, who ever would affirm, that lichens can derive all the parts constituting their organisation from pure air (oxygen, azote, carbonic acid)? And who, also, would affirm that rain-water is the same as the distilled water of the chemist's laboratory? But we may correctly say that pure or naked air (if the expression may be allowed) is by no means adapted for the food of lichens, but by drying them up checks and represses their nourishment; though at the same time they do not love places which are not open to salubrious air. It is manifest that the air does not directly nourish them. So far, however, as relates to the manner in which lichens draw their nourishment (aerial, solid, and in solution) from water or by means of water (atmospheric or other), it can very easily be shown that it chiefly penetrates through the surface of the thallus (the cortical stratum). And how far the nature of the substratum is indifferent to them is evident from the circumstance that very many of them occur promiscuously on the most diverse substrata. Thus the same lichens occur on the hardest rocks, on dry wood (even indurated by dryness), or on dead bark; from all of which they assuredly could not extract similar aliment, if, indeed, they were able to annex even any particles to themselves. What, for example, is to be derived from the old sapless bark of a pine? or what analogous from a quartzose rock? But the same Lichens grow alike on both. Nor is it to be overlooked that many of the same are at the same time muscicole, and often only loosely affixed—which very dissimilar stations, nevertheless, would seem to present similar food, for these plants remain most similar in all; nor is the substratum lying under them (under the thallus, hypothallus, or gomphus) ever observed to be worn or comminuted. From all these reasons, then, we may conclude that the substratum is scarcely of any importance, so far as nutrition is concerned. But, in addition to this, lichens are so formed that foreign elements usually could not, or could only with difficulty, arise from the substratum. The crustaceous thalli, indeed, not rarely exhibit under the cortical gonidial stratum a tartareous medulla, or thick deposit, not readily permeable, and nearly dead, and often a hypothallus conglutinating the lichen closely to the stone, and this also but little pervious.* But by a very simple and easy experiment the

* Here the author adds, in a note in my copy—"The same is observed in terrestrial or muscicole fruticulose thalli, for their lower part next to the substratum is destroyed and seen to be dead, when the upper parts only of the lichen are in full vigour. The life thus being lost in the part contiguous to the substratum, nothing through it can arise from the substratum. The nutritious elements, indeed, in these lichens, as in the others, are received through the external and upper parts."

case is proved in fruticulose thalli, which, immersed in water by the gomphus (that is, which are affixed very solidly to the substratum by means of a conglutinating hypothallus), or at the lower part, are by no means penetrated by this upwards; whence it is abundantly shown that the entrance to the nourishing moistures by no means lies open from the substratum. On the contrary, it is everywhere seen that immediately the thallus externally (or on the surface looking towards the light) is moistened it promptly imbibes water, and at once becomes vegetous. Thus, for example, *Usnea* submersed at the base of the thallus remains dry (except only the very part which is submersed), but should water be sprinkled over it it very greedily absorbs it, and presently softens and revives. This experiment may be regarded as more than sufficient to demonstrate that the atmosphere directly, by means of rain-water (from the clouds or dew, &c.), transfers nourishing matter to Lichens, and that these can scarcely enter into their texture from the substratum, unless sometimes in crustaceous thalli (received as if mechanically, and not as the result of nutrition properly so called), *e. g.*, iron and lime, which in solution are drunk up, and remain in drying, whence the ferrose and calcareous states of Lichens derive their origin.* Besides this, the active life, having its seat chiefly around the gonidia, and putting forth young parts (lobes, laciniae, branchlets, isidia), and being manifested in the vital function of the apothecia and the spermogones, it is apparent also that in these superficial parts the nourishing humours necessary for all the actions of life are especially and directly poured upon them. For this reason, we see that the thalline surface delights in an anatomical texture which assists such absorption, and that similarly the apothecia and the spermogones are observed well filled with a very hygroscopic lichenine gelatine, and draw to themselves water, the primary condition of life, and receive nourishment through the medium of water from the clouds, from rain, from fountains or rivers, or even (in the case of maritime Lichens) from the sea.†

Moreover, in p. 6, it is observed—"Silicicole Lichens, which occur exceptionally upon calcareous rocks of sufficient hardness, but never upon organic substrata. For example, *Lecanora gibbosa*, *Lecidea geographica*, *Lecidea contigua*, &c." This does not seem quite consistent with the words of the author in the same page—"The attentive observation which during several years I have been able to make of a great many of these vegetables in the most varied conditions of existence," for it is very evident, and has been published over and over again in Lichenological literature, that these, in addition to many other silicicolous ones, occur also upon dead bark or old wood. That "never," therefore, is to be deleted. Nor

* In primary limestone neither calcareous states nor calcivorous apothecia scarcely occur.

† In a note by the author in my copy, he says—"In the *Collema*cei, in which the entire thallus is perfused with lichenine (or Lichen gelatine), all its parts are observed to be very hygroscopic.

would there be wanting other observations in regard to that division of Lichens which the author admits, and upon which subject he has neglected many more recent documents.

In the same place Dr. Weddell says, in a note—"The oxalate of lime constitutes . . . one of the essential characters of this class of plants." This is an error, for the occurrence of oxalate of lime in octohedral crystals is not to be regarded but as a character in doubtful cases, distinguishing the thallus of a lower Lichen from those Fungi which it resembles. But oxalate of lime is especially peculiar to certain medullæ (*vid.* Nyl. *Syn.*, p. 11); on the other hand, it is entirely absent—for example, in the *Collemacei*, as is shown in every microscopical drawing of their thalli yet published, and which is altogether elementary. Elsewhere I have indicated (Nyl. *Obs. Peziz. Fenn.*, p. 37), under *Peziza amentacea*, Balb., "The hypothecium contains crystals of oxalate."

II.

With respect to the Lichens of the public garden of Blossac compared with my note concerning those of the garden of the Luxembourg, at Paris, I may observe that my intention in it was only to show what Lichens might be found in the midst of a very large city,* which can in no way be compared with the vegetation of a town which entirely presents the vegetation of the neighbouring rural tracts. Concerning chemical re-agents, we find it laid down—"The truth is, an experience of many years permits me to affirm that there are some things in the new method to accept and some to reject." We may expect to learn from the experience of the author, what, in his judgment, are to be rejected, and what, on the contrary, are to be approved of or retained. Also the incomparable writer of Upsala, thinking in former publications, "the reactions fallacious and variable," and "of little or no importance," lately confesses and kindly concedes, that "he does not entirely despise this character, sometimes as auxiliary" (that is nearly sub-auxiliary) "Scand.," p. 60; nevertheless, he expounds no better character in his writings, and most eagerly adduces the chemical characters indicated by me, than which none others are indeed more constant. He looks down upon them, but he lays hold of them.† The naked truth is ("la vérité est") that the

* Not a single Lichen, and scarcely even the trace of any thallus, are to be perceived in any of the public parks of London.—J. M. C.

† In the same place there occur these words—"It would be incongruous if lichens and not also other plants could be distinguished in this way." But the opinion may rather be regarded as incongruous, which would maintain that lichens in this respect are of an identical nature, for they show a nature altogether peculiar. Nor may it be overlooked that in Th. Fr. "Scand.," p. 187, there is openly announced "a new discovery." The author declares that he has employed *acetic acid* as a reagent "with great success." He may not, therefore "despise" this lucky acetic acid, but happily use it. The next time he will no doubt reveal wonderful things effected by the help of this acid, and what splendid successes he has obtained.

chemical characters are entirely similar, and of similar value with the other characters; all are *auxiliary*, but the former excelling in simplicity and perspicuity, are at the same time very easy and necessary. Accordingly in the present state of Lichenography, we may not neglect them, or if we do neglect them, the whole of Lichenography would become worthless and profitless. But it is of the greatest importance that those as well as the other characters should be rightly and accurately observed; for, if badly and unskilfully employed, they lead to errors; as happens through any defect of dexterity and sound judgment in matters relating to science, and nowhere is expertness and judgment more necessary.

In p. 16, we read, "I have seen in some apothecia of this variety, or of the following, the normal spores of *Lecanora subfusca* replaced by the spores in equal number of an entirely distinct physiognomy—spores twice as large, brown, 1-septate, without apparent change in the other portions of the apothecium. M. Nylander, to whom I submitted pieces, has hesitated to pronounce upon the possible causes of such an anomaly." Here the experience of the author by no means shines forth. He had, indeed, submitted to me heterogeneous apothecia, growing mixed with the apothecia of a certain "*Lecanora subfusca*," saying on a label, "apothecia *L. subfusca*," bearing different spores (brown, 1-septate)," an absurdity unworthy of any lichen whatever, or any other plant. I answered, "this is something marvellous; I have known nothing so prodigious." This the author does not seem to have understood, nor very faithfully rendered. "Nylander has hesitated, &c.," when on a more attentive examination, the wonderful knot could easily be solved. Manifestly it relates to two lichens occurring conjointly, as is every day seen, with the thalli so intermingled that the different apothecia appear as if sitting on the same thallus.* Examining to-day those apothecia which were sent, it was at once evident that the apothecia with the brown spores belonged to *Physcia aipolia*. Accordingly, *Lecanora subfusca* was growing mixed with this *Physcia*, which was the "wonder." It may be added that, in no respect, either external or anatomical, do the apothecia of both present any likeness.†

* This is equally the case, and perhaps even more frequently so with the spermogones, which it cannot be doubted are as constant in their character in the different species as are the apothecia. Inattention to this has led Dr. Lindsay to propound his very erroneous theory of the "Polymorphism of Spermogones."—J. M. C.

† It may be observed that lichens occurring without any thallus, or as parasites of other lichens, are of a very low order; the inferior *Lecideæ* (nearly *Patellariæ*, scarcely any *Biatoreæ*), *Opegraphæ*, *Arthoniæ*, *Melaspilæ*, *Verrucariæ*, *Endococci*, *Mycopora*. Some *Biatoreæ*, which seem to occur as parasites, and as if athalline, yet are not entirely destitute of traces of a thallus (thus, for instance, gonidia are observed amongst the apothecia of *Lecidea Hecrii*, Hepp., on the thallus of *Peltigera* (Nyl., in my copy.) I may here notice also that *Lecanora sophodes*, var. *pictavia*, Wedd., p. 17, is certainly nothing new. Elsewhere I may adduce the names formerly received.

NOTICES OF NORTH AMERICAN FUNGI.

By the REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 101.)

476. **Melanconium oblongum.** *B.*—Pustulis elevatis late conicis tectis; sporis oblongis.

On *Juglans cinerea*. Massachusetts. No. 3380. Alabama, Peters. No. 5250; spores .0008 long, with an oil globule, one side curved. A very different plant from *Stilbospora ovata*, which also occurs on walnut.

477. **Stilbospora brevis.** *B. & R.*—Subcorticalis, tarde sporas oblongas utrinque obtusas triseptatas emittens.

On rather thick bark of hornbeam. South Carolina. Ravenel. No. 1360.

At first entirely concealed by the bark, then sending out the black oblong triseptate spores, the breadth of which is one-third of the length.

478. **Stilbospora pinicola.** *B. & C.*—Soris oblongis erumpentibus; sporis oblongis, utrinque obtusis triseptatis, articulis uninucleatis leviter constrictis.

On the under side of pine leaves. No. 4791.

Forming little oblong hysteriiform spots, at first surrounded by the cuticle; spores oblong, .0008 long, .0002 wide, constricted slightly at the joints, each of which has a single globose nucleus.

* **Steganosporium cellulosum.** *Cl.*—On *Acer saccharinum*. Pennsylvania, Michener. No. 3604. Mountains of Upper Carolina. Curteis. No. 4501. Spores .002 long.

* **Coryneum Kunzei.** *Cl.*—On oak branches. Pennsylvania. Michener. No. 5125.

479. **Coryneum decipiens.** *B. & C.*—Sporis oblongis utrinque obtusis triseptatis longe pedicellatis.

On bark. New England. Murray. No. 5670.

Forming little erumpent pustules; spores oblong, obtuse at either end, triseptate, .0006 long, about $\frac{1}{3}$ as much broad, seated on long hyaline pedicels. No. 3339, on chesnut from the Virginian Mountains, is either the same or very closely allied, but the spores are attenuated at the base, and I have not seen the same elongated pedicels.

* **Coryneum pulvinatum.** *Kze.*—On *Tilia Americana*. Virginia Mountains. Car. Inf. Curtis. No. 3331, 3402. Canada. Dr. McLagan.

* **Coryneum compactum.** *B. & Br.*—On *Betula rubra*. Car. Sup. Curtis. No. 313.

* **Coryneum mycrostictum.** *B. & Br.*—On Rose. Alabama. Peters. No. 5209.

480. **Coryneum Negundinis.** *B. & C.*—Pustulis minutissimis;

sporis brevibus biseptatis e pedicellis crassiusculis furcatis reticulatisque oriundis.

On twigs of *Acer Negundo*. Car. Sup. No. 893.

Pustules extremely minute; spores pallid, oblong, very slightly attenuated at either end, biseptate, about half as wide as long, springing from hyaline, rather thick pedicels, which are forked or reticulated.

481. **Coryneum castanicola**. B. & C.—Pustulis epidermide arcte circitis; sporis elongatis breviter pedicellatis pluri-septatis; endochromatibus denum verticaliter divisis.

On smooth branches of chesnut. Pennsylvania. Michener. No. 4324.

Pustules raising the cuticle by which they are closely surrounded; spores elongated, slightly curved, pluriseptate, the endochromes at length divided by one or sometimes two septa. The spores are of the same form as those of *C. Kunzei*, but are distinguished by the vertical divisions of the septa.

482. **Coryneum irregulare**. B. & C.—Pustulis elevatis distinctis; sporis obovatis 4-6 septatis; endochromatibus verticaliter divisis; pedicellis tenuissimis.

On birch. Alabama. Beaumont. No. 5121.

Pustules distinct, raised; spores large, .002 long, obovate, attenuated below, 4-6 septate, the lower divisions very narrow, and gradually passing into the short, very slender stem, the endochromes divided vertically, each division containing a single globose nucleus.

483. **Seiridium Liquidambaris**. B. & C.—Pustulis epidermide arcte inclusis; apice carneo; sporarum articulis ellipticis.

On twigs of *Liquidambar*. Car. Inf. No. 3718.

Pustules completely inclosed, except at the rather mealy flesh-coloured apex. Joints of the spores elliptic, not so elongated as in *Seiridium marginatum*; interstices cylindrical.

* **Pestalozzia Pezizoides**. De Not.—On *Vitis riparia*. Car. Sup. Curtis. No. 209. Murray.

* **Pestalozzia Guepini**. De Not.—On orange leaves. Massachusetts. Murray. No. 5459. On *Lagerstræmia*. Car. Inf. No. 6186. On peach. Car. Inf. No. 5037. On *Smilax*. No. 2720.

Also with *Discosia ocellata*, B. & C., on *Magnolia grandiflora*. Car. Inf. No. 5011.

* **Pestalozzia funerea**. Desm.—On *Cupressus thujoides*. Car. Inf. No. 2610. A variety, with rather narrower spores, occurs on pine. Car. Inf. No. 3797. On *Araucaria*. Pennsylvania, Michener. No. 5164.

I cannot distinguish from these latter, No. 4482, on *Rhododendron Catawbiense*, Mountains of Car. Inf., or No. 1370, on the fruit of roses, Ravenel. These two, perhaps, may properly be considered varieties of *P. Guepini*.

484. **Pestalozzia unicolor.** *B. & C.*—Pustulis minutissimis; sporis oblongis utrinque leviter attenuatis triseptatis hyalinis.

On juniper. New England. Sprague. No. 6324.

Pustules extremely minute, situated on the grey fibres of the exposed wood; spores oblong, slightly attenuated at either end, .001 long, very pale.

485. **Pestalozzia stictica.** *B. & C.*—Pustulis minutissimis; sporis subdoliiformibus biseptatis.

On leaves of *Platanus occidentalis*. Santee River. No. 1638.

On leaves of *Tilia*. Alabama, Beaumont. No. 4608.

Pustules very minute; spores swollen in the middle, with two septa, exclusive of those which separate the highly developed crest and the short pedicel. The dark part, .0006 long and almost as much wide.

486. **Pestalozzia torulosa.** *B. & C.*—Pustulis parvis, sparsis, vel e macula nigrâ oriundis; sporis biseptatis torulosis.

On seeds of water melon. Car. Inf. No. 5035.

Pustules minute, scattered, or springing from a black spot; spores with two septa, exclusive of those which separate the crest and pedicel, strongly constricted at the articulations, .001-.0015 long, the upper and lower joints sometimes brown.

487. **Pestalozzia hysteriiformis.** *B. & C.*—Pustulis minutis e macula arida decolorata oriundis; sporis breviter fusiformibus; biseptatis pedicellis hyalinis elongatis.

On leaves of *Quercus nigra*.

Pustules minute, springing from greyish discoloured concentrically divided spots; spores shortly fusiform, biseptate, with long hyaline slender pedicels.

488. **Pestalozzia compacta.** *B. & C.*—Pustulis elevatis medio perforatis; sporis angustis triseptatis.

On stems of hops. Car. Inf. 6030.

Pustules distinct, elevated, perforated in the centre; spores narrow, oblong, triseptate, brown. The spores resemble those of the varieties of *P. Guepini* mentioned under *P. funerea*.

489. **P. stellata.** *B. & C.*—Pustulis stellatis e macula alba oriundis; sporis subdoliiformibus biseptatis.

On leaves of *Ilex opaca*. Car. Sup. No. 4921.

Pustules stellate, seated on a circular white spot surrounded by a black line; spores short, swollen in the centre, biseptate; pedicels about the same length, attenuated downwards.

490. **Pestalozzia annulata.** *B. & C.*—Pustulis punctiformibus e macula alba fusco-cincta oriundis; epidermide centro excepto tectis annulatis; sporis fusiformibus 2-3 septatis.

On *Ilex*. Alabama, Beaumont. No. 4871.

Pustules punctiform, perforated in the centre, covered with the cuticle, and surrounded by a black ring, springing from a large marginal white spot with a brown border; spores fusiform, bi-

triseptate .002 long, with a pedicel of the same length, attenuated downwards. Quite distinct from the last species.

* **Pestalozzia Laurina.** *Mont.*—The spores slightly shorter than in an authentic specimen.

On leaves of *Laurus Caroliensis*. *Car. Inf.* No. 2712.

491. **Pestalozzia concentrica.** *B. & Br.*—Pustulis concentricis e macula pallida oriundis; sporis triseptatis, ut plurimum monochætis.

On leaves of *Pyrus*. *Car. Inf.* Ravenel. No. 1354. On apple leaves. Mountains of Upper Carolina. No. 4497. On *Cratægus*. Alabama, Beaumont. No. 4607. On *Castanea pumila*. Beaumont. No. 5094.

Pustules concentrically arranged in the more typical form on a pallid or white spot; spores rather variable in form, about .001 long, with, in general, a single oblique process at the apex, more rarely with a three-threaded crest. The process is sometimes quite horizontal. Nearly allied to *P. monochæta*, *Desm.*

492. **Cheirospora Micheneri.** *B. & C.*—Soris elevatis, minutis; sporis longe pedicellatis globosis vel irregulariter obovatis, fuscis e cellulis globosis indefinitis membranâ tenui circumdatis.

On hornbeam. Pennsylvania, Michener. No. 4315.

Forming little elevated pustules; spores with long slender hyaline pedicels, which are sometimes forked, brown, globose, or irregularly obovate, consisting of a number of cells contained within a thin membrane.

* **Nemaspora crocea.** *P.*—On bark of various trees. *Car. Inf.* Ravenel. No. 925. *Curtis.* No. 1145, 1165.

* **Nemaspora aurea.** *Fr.*—Michener. No. 3819.

493. **Nemaspora pruinosa.** *B. & C.*—Pustulis pruinosis, intus cellulosis; sporis minutissimis.

On *Echinocactus*. Massachusetts. Murray. No. 5461.

Pustules gregarious, elevated, distinctly pruinose, irregularly cellular within; spores extremely minute, subelliptic.

494. **Nemaspora rufa.** *B. & C.*—Pustulis irregularibus applanatis intus cellulosis; sporis minutissimis motu Browniano præditis.

On branches of *Magnolia*. No. 4555.

Pustules irregular, depressed, black cellular within; spores extremely minute, subglobose, endowed with Brownian motion.

495. **Nemaspora decipiens.** *B. & R.*—Pustulis subcortice abditis; sporis brevibus filiformibus curvulis pedicellis brevioribus.

On bark, which is soon covered with the spores, so as at first sight to look like *Corticium viscosum*. Sulphur Springs. *Car. Sup.* Ravenel. No. 1519.

Pustules completely concealed by the bark, sending out innumerable very short linear, slightly curved, yellowish spores, which spring from pedicels rather longer than themselves.

496. **Nemaspora Rhoidis.** *B. & C.*—Pustulis basi dilatatis cortice arcte cinctis extus nigris intus pallidis; sporis oblongis hyalinis.

On *Rhus*. Maine. Rev. J. Blake. No. 6297.

Pustules prominent, closely surrounded by the bark, except at the apex, brown pallid within, spores hyaline, .0006-.0005 long, obtuse at either end, about $\frac{1}{4}$ wide.

497. **Nemaspora Russellii.** *B. & C.*—Pustulis gregariis epidermide pallida ferme tectis; sporis fusiformibus pedicellis hyalinis æquatis.

On branches of *Robinia*. New England. Russell. No. 5911 bis.

Pustules gregarious, almost covered by the pallid cuticle; spores fusiform, rather oblique, .0005-.0004 long, seated on pedicels of the same length.

498. **Nemaspora viridis.** *B. & C.*—Pustulis truncatis prominentibus; sporis viridibus ellipticis e pedicellis elongatis hyalinis oriundis.

On birch. No. 4899.

Pustules prominent, black, truncate above; spores elliptic or elliptic-oblong, about .0006 long, but rather variable in size, about half as much wide, green, granular within, springing from slender hyaline elongated pedicels.

499. **Nemaspora brachyspora.** *B. & C.*—Pustulis elevatis obtusis libeiris, sporis curvulis reniformibus.

On bark. No. 2647 bis.

Pustules scattered, obtuse, free; spores about .0006 long, half as much wide, reniform.

500. **Nemaspora erythræa.** *B. & C.*—Pustulis epidermide tenui tectis, gregariis, intus cellulis globosis præditis; sporis minutissimis.

On twigs of roses. No. 3188.

Pustules minute, gregarious, covered with the thin cuticle, depressed, with a single row of globose cells within, the walls of which are covered with extremely minute, shortly oblong spores.

REHM'S ASCOMYCETEN.

No mycological student of the present day need complain of any lack of published specimens to assist him in his researches. Since the publication of Fries' *Scleromycetes Sueciæ*, Mougeot and Nestler's *Stirpes Cryptogamicæ*, etc., this method of diffusing a knowledge of the science has found much favour amongst fungologists. Each year brings into existence some fresh series of "*Exsiccati*." There are in course of publication at the present time, amongst many others, collections representing the mycological flora of Austria, of Great Britain, of the European Continent, and we believe, one is in contemplation which will include species from all parts of the world. Dr. Rehm, of Windsheim, has undertaken the illustration, by actual specimens of the *Ascomycetes*, a class of

fungi to which this mode of representation is especially applicable on account of the facility with which they can be dried, so as to retain their microscopical characters unimpaired. Each fasciculus contains fifty specimens, which are carefully arranged and very richly represented—

Fasc. I. contains—*Ascobolus furfuraceus*, Pers., *Leucoloma carnea*, (P.), *Crouania asperior*, (Nyl.), *C. humosa* (Fr.), *Peziza hemisphærica*, Wigg., a variety with verrucose sporidia; *Humaria gregaria*, Rehm., *Pyronema luteopallens*, Nyl., *Pustularia cupularis* (L.), *Helotium virgultorum*, Fr., *Formæ fructigenum* and *conigenum*, *H. epiphyllum*, Fr., *H. herbarum*, Fr., *Ciboria firma* (Pers.), *Dasycephala virginea* (Batsch.), *Pyrenopeziza Lojkæ*, Rehm., a new species allied to *Peziza atrata*, *Leptosphæria Nitschkei*, Rehm., *Lachnella barbata*, Fr., *Calloria vinosa*, A. & S., *Durella æruginascens*, Rehm., *Melaspilea Peltigeræ*, Nyl., *Scutula epigena*, Nyl., *Karschia nigricans*, Rehm., *Stictis ollaris*, Wallr., *S. Carestiae*, De Not., *Hysterium elatinum*, Pers., *H. pinicolum*, Rebm., *Hysterographium Fraxini*, De Not., *Colpoma quercinum*, Wallr., *Baggea pachyascus*, Awd., *Leciographia pulvinata*, Rehm., *Ostropa cinerea*, Fr., *O. cubicularis*, Fekl., *Sphærella Hageniæ*, Rehm., on the thallus of *Hagenia ciliaris*, *Pharcidia congesta*, Korb., *Sporormia minima*, Awd., *Leptosphæria agnita*, Ces. & De Not., *Melanomma pomiformis* (P.), *Nectriella Robergei* (Desm.), *Nectria lecanodes*, Ces., *N. Lamyi* (De Not), *N. pyrrhocolora*, Awd., *Amphiosphæria Xylostei*, (Pers.), *Teichospora obducens*, Fekl., *Bertia querceti*, Rehm., *Diaporthe fibrosa*, Nitschke, *Aglaospora profusa*, Tul., *Valsa eunomia*, Fr., *V. ambiens*, Fr., *V. dissepta*, Fr., *Rhaphidospora Carauorum*, Tul.

Fasc. II. contains—*Helvella lacunosa*, Afz., *Ryparobius Cookii*, Boud., *Pustularia vesciculosa*, Fekl., *Leucoloma ascoboloides*, Rehm., n. sp., *Pithya chrysophthalma* (Pers.), *Helotium virgultorum*, Wahl., forma *scutula*, *H. amenti*, Fekl., *Peziza alniella*, Nyl., *P. convivalis*, Fr., *P. urticæ*, *P. Humuli*, Lasch., *P. clandestina*, Bull., *P. calycina*, Sch., *Pizizella avellanæ*, Fekl., *P. Hungarica*, Rehm., *Peziza leucophæa*, Pers., *P. Artemisiæ*, Lasch., *Pyrenopeziza vitis*, Rehm., *P. carduorum*, Rehm., *P. fuscorubra*, Rehm., *P. Niptera polygoni*, Rehm., *Calloria coccinella*, Sommf., *C. fusarioides*, Tul., *Durella macrospora*, Fekl., *Bulgaria inquinans*, Fr., forma *tetraspora*, *Hysterium Prostii*, Duby, *Propolis versicolor*, Fekl., *Uncinula bicornis*, Lév., *Hypoxydon udum*, Fr., *Cryptovalsa ampelina*, Fekl., *Diaporthe reipris* (Nitschke), *Valsa rhodophila*, B. & Br., *V. salicina*, Fr., f. *tetraspora*, *Cryptospora suffusa*, f. *polyspora*, *Nectria indigens*, Rehm., *Gibbera Winteri*, Rehm., *Trematosphæria Morthieri*, Fekl., *Lophios-toma caulium*, De Not., *Rosselinia rimicola*, Rehm., *Enchyosphæria pinetorum*, Fekl., *Leptosphæria modesta*, Desm., *L. rubicunda*, Rehm., *Pleospora doliolum*, Pers., *Rhaphidospora rubella*, Pers., *Gnomonia vulgaris*, De Not., *G. tubæformis*, Tode, *Sphæria Genistæ*, Fekl., *S. spurca*, Wallr., *S. Byoniæ*, Fekl., *Sphærella Tussilaginis*, Rehm.

BRYOLOGICAL NOTES.

By E. M. HOLMES.

The occurrence of the following new species in localities other than those which have already been published may, perhaps, be interesting to British bryologists :—

Barbula sinuosa.—On a stone in a hedgebank in a limestone district, near Totnes, Devon; Leigh Woods, near Clifton, Bristol, on limestone; Buckingham, on the exposed roots of trees, and at the base of their trunks, growing with *Tortula latifolia*, on oolitic soil; Hanwell, near Banbury, on a damp oolitic limestone wall; Oxford, on a tree stump by the side of the canal; Dunton Green, in a wood on the chalk.

In the moist state it occurs generally in small dense tufts which resemble *T. vinealis* in appearance, but have the peculiar colour of *Grimmia pulvinata*. When growing in dry places, or on the tops of limestone walls, as at Plymouth, it is of a somewhat brownish-green colour. When dry it resembles *Tortula nitida*, but the nerve is not glossy, and each stem appears separated from its fellow, although united below by tomentum.

Under the microscope it is readily known by the fragile tips of the leaves, of which the young and more perfect ones are seen to have two or three irregular teeth at the apex.

Dicranum montanum.—Abbey Wood, Kent. On the stumps of chestnut trees (*Castanea vesca*) which have been cut down, but which have sent out a new growth; the soil is sandy. It grows intermixed with *Tetraphis pellucida*, and occurs in densely compacted tufts of a deep green colour, in appearance resembling *Weissia cirrhata*, but with the leaves rather more erect. It also resembles that plant when dry. Under the microscope, however, it is readily distinguished from it by the margins being serrated as well as the back of the nerve towards the apex of the leaf. The leaves are also distinctly papillose.

Stereodon canariense.—Near Buxton (Mr. E. George). The specimen I have received is a dense flat tuft in which the stems are about $\frac{1}{2}$ inch long, and erect; it has a more rigid appearance than *H. cupressiforme*. The district in which it occurs is limestone.

Pottia cavifolia.—I have only seen this plant growing on oolitic soil, and believe it to be confined to that soil and magnesian limestone. On the oolite it is extremely abundant, the mud-capped heads being brown with its capsules.

Amblystegium confervoides.—On limestone rocks, in Leigh Woods, near Clifton, Bristol. In fruit August, 1873. It grows in thinner tufts than *Hypnum serpens*, and is of a darker, almost blackish-green colour in old specimens, and is in young fruit in July, and the beginning of August.

Tortula sinuosa, IN OXFORDSHIRE.—A few days ago Mr. F. Westell forwarded to me a specimen of this beautiful moss, gathered by him near Witney during the present month, and in the note accompanying it he states that Mr. H. Boswell has also gathered it near Oxford. I have not specimens from Mr. Boswell, but there can be no question about the Witney Moss, and from Mr. Boswell's well-known character as a Bryologist, his word is quite sufficient. We have thus another county for this moss, in addition to those already recorded of Sussex (Davies), Cornwall (Boner), Devonshire (Holmes), and near Bangor (Wilson). It is figured in "Journ. of Bot.," vol. ix. (1871), p. 289, pl. 120, fig. 6.

CHAS. B. HOBKIRK.

BRITISH MYCOLOGISTS will regret to learn that Mr. A. Jerdon, of Allerton by Jedburgh, N.B., is deceased. For many years he was an assiduous collector of Cryptogamia, and was instrumental in augmenting our Flora with several very interesting species, some of which bear his name.

CRYPTOGAMIC LITERATURE.

CUNNINGHAM, Dr. D. Microscopic Examinations of Air. Calcutta, 1874.

SMITH, H. L. The Siliceous shelled Bacillaria or Diatomaceæ, in the "Lens." Dec., 1873.

SMITH, H. L. On the preparation of Diatomaceæ, in the "Lens." Dec., 1873.

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Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY
AND ITS LITERATURE.

BRITISH FUNGI.

By the EDITOR.

(Continued from Page 139.)

Puccinia Bistorta. D.C.

Spots none ; sori scattered, minute, numerous, rufous, hypophyllous, suborbicular, spores ovoid or oblong, obtuse, rounded, bright brown, stem very short.—*De Can., Flor. Fr.* v. 61. *Corda Icon.* iv., f. 61. *Libert. Exs.*, No. 91. *Puccinia vivipara*, Grev., MSS.

On leaves of *Polygonum viviparum*, near Mar Lodge. Aug., 1822 (Dr. Greville). On *Polygonum Bistorta*, near Liverpool. (R. McL.)

Uromyces excavata. D.C.

Spots none or yellowish ; sori scattered, surrounded by the inflated epidermis ; spores brown, obovate, shortly pedunculate and sessile.—*Uredo excavata*, D.C., *Fl. Fr.*, vol. ii., p. 227. *Berk. Exs.* No. 119. *Cæoma excavum*, Lk. *sp.* ii., p. 34.

On *Euphorbia exigua*, in company with *Æcidium Euphorbiæ*. King's Cliff, Norths.

Omitted in Berkeley's "Outlines" and Cooke's "Handbook," through oversight.

Æcidium Parnassiæ. Graves.

Hypophyllous, spots pallid, cups laxly disposed in subrotund tufts, yellowish-brown, urceolate, margin thick, nearly entire, spores pallid.—*Graves, in Duby. Bot. Gall.*, ii., 904.

On leaves of *Parnassia palustris*. Near Glasgow. (Dr. Greville.)

This will follow No. 1626 in the "Handbook of British Fungi."

SYNCHYTRIUM. De Bary.

Cellules often numerous, aggregated, involved in a common membrane, forming sori, endochrome orange, delicately granulose ; zoogonidia globose, rarely oval or oblong.—*Rabh. Algæ Europ.*, ii., 284.

Entophytral, with the habit of *Uredo*, seated in the parenchyma of terrestrial plants.

Synchytrium taraxaci. *De By. & Wor.*

Cellules variable, seated beneath the cuticle of living leaves.—*Cohn's Beitrage*, p. 39. *B. & Br. Ann. N.H.*, 1388.

On leaves of common dandelion. Batheaston.

Zoogonidia .00013 m.m. diam.

Synchytrium mercurialis. *Fuckel.*

Tubercles confluent on the nerves of the leaves, hemispherical, greenish, depressed above, umbilicate; sori oblong, grey; zoospores globose, uninucleate, hyaline.—*Fuckel F. Rhen.*, No. 1607. *Schroet in Cohn's Beitr.*, p. 40. —*B. & Br. Ann. N. H.*, 1389.

On leaves of *Mercurialis perennis*. Batheaston. April.

Spores echinulate, .0012-.0015 in.

Synchytrium anemones. *Wor.*—*Schroet in Cohn Beitr.*, p. 40. *B. & Br. Ann. N.H.*, 1389.* *Chytridium anemones*, *D'By.*, in *Rabh. Algæ Eur. ii.*, p. 284.

On leaves and petals of *Anemone nemorosa*.

Spilocæa pomi. *Fr.*

Spots often confluent, at first covered by the thin cuticle, which is soon broken and evanescent; spores densely adnate, subglobose or oval.—*Fries Sys. Myc. iii.*, 504. *Grevillea, ii.*, p. 64.

On apples.

Doubtless only a condition of *Cladosporium*.

Mitruia alba. *Sm.* (*Grevillea, i.*, p. 136, t. x., fig. 7.)

Amongst submerged leaves.

Vibrissea Margarita. *White.*

Simple, head orbicular, orange-red, margin hispid, stem cylindrical, hirsute with black articulated hairs, internally white. Asci and sporidia?—*Buchanan White*, in "*Scottish Naturalist*" for Jan., 1874.

On dead sticks. Sept. Oct.

Rhizina lævigata. *Fr.*

Orbicular, even, brown, margin prominent, granulose beneath, fibrils pallid; asci cylindrical; sporidia broadly fusiform, acuminate, binucleate, uniseriate, hyaline.—*Fries Sys. Myc.*, ii., 33. *Octospora rhizophora*, *Hedw. Musc. Frond, ii.*, t. 5, f. A.

On stumps,

[Plate 22, fig. 1. Ascus with sporidia and paraphysis. *b*, sporidia $\times 320$.]

Peziza (Aleuria) isabellina. *Sm.* (*Grevillea, i.*, p. 136, t. ix., fig. 1-4.)

On decayed coniferous wood.

Peziza (Aleuria) undata. *Sm.* (*Grevillea, i.*, p. 136, t. x., figs. 1-6.)

On tree-fern stems.

Peziza (Humaria) Chateri. *Sm.* (*Grevillea, i.*, p. 120, t. viii., f. 1-2.)

Peziza (Mollisia) Bullii. *Sm.* (*Grevillea, i.*, p. 120, t. viii., f. 3.)

Peziza (Dasyscypha) lasia. *B. & Br.*

Cups globose, erumpent, orange, at length opening with a torn, dentate mouth, externally gummy; asci elongated; sporidia fusi-



form, paraphyses urn-shaped above, sometimes uniseptate, intermixed with short flocci.—*B. & Br. Ann. N. H.*, 1391, t. 8, f. 10.

On elm. Langridge. Mar.

Cups smaller when on bark; sporidia $\cdot 0005$ in. by $\cdot 0001$ in.

[Plate 22, fig. 2. *a*, paraphysis; *b*, ascus with sporidia; *c*, sporidia; *d*, tip of paraphysis.—*B. & Br.*]

RHYPAROBIUS. *Boudier.*

Cups very minute, scarce conspicuous to the naked eye, waxy, marginate, sessile; disc plane; asci prominent; when dry margin inflexed, rounded; paraphyses rare, short, septate; asci minute but broad, polysporous, dehiscing with a convex operculum; sporidia very minute, hyaline.—*Boudier, Mem. Asc.*, pp. 47.

Rhyparobius dubius. *Boud.*

Scattered, just conspicuous under a lens, pale grey or tawny, pellucid, rounded; margin not distinct; asci oblong or oblong-ovate; sporidia 128 (?), oblong-ovate, minute, hyaline.—*Boud. Ann. Sci. Nat.* (1869) x., p. 240. *B. & Br. Ann. N. H.* 1392.

On rabbit's dung. Bathford.

Rhyparobius Cookei. *Boud. (Grevillea, i., p. 132.) B. & Br. Ann. N. H.* 1393.

On dog's dung. Batheaston.

Rhyparobius argenteus. *B. & Br.*

Very minute, silvery white, ciliated with soft hairs; asci short; sporidiiferous cysts elliptic, seated towards the apex; sporidia fusiform; paraphyses furcate.—*B. & Br. Ann. N. H.*, 1394, t. 9, f. 11.

On rabbit's dung; for the most part attached to filaments of *Mucor*.

Cups $\cdot 004$ in. across; asci $\cdot 004$ in. long; sporidia normally 64 in each cyst $\cdot 0007$ in. long, $\cdot 00025$ - $\cdot 0003$ in. wide. Scarcely visible to the naked eye; asci opening with a little lid, which splits vertically. Comes near to *R. felinus*, B., but has soft hairs, and is of a pure white; tips of paraphyses slightly enlarged.

[Plate 22, fig. 3—*a*, asci with cyst; *b*, paraphysis; *c* sporidia.—*B. & Br.*]

Rhyparobius woolhopensis. *Renny.*

Minute, scattered, at first pure white, then dingy; cups with a thick stem-like base, which is tuberculate, covered above with close-set hairs which fringe the margin, at length expanding, the hairs disappearing with age; substance of base vesicular; paraphyses simple; asci clavate; sporidia fusiform (normally 64).—*B. & Br. Ann. N. H.*, No. 1395, t. 9, f. 12.

On bird's dung, mixed with filaments of *Mucor*.

Cups $\frac{1}{2}$ line ($\cdot 041$ in.) high; sporidia $\cdot 0007$ in. long; cells of base often $\cdot 0015$ - $\cdot 0018$ in. long.

[Plate 22, fig. 4—*a*, ascus with cyst; *b*, sporidia.—*B. & Br.*]

Bulgaria purpurea. *Fekl.*

Receptacles as in *Bulgaria sarcoides*, but larger and more robust;

asci scarcely stipitate, cylindrical; sporidia biseriate, lanceolate, sometimes curved, multinucleate, hyaline; paraphyses filiform, not thickened at the tips. *Coryne purpurea*, Fckl. *Sym. Myc.*, p. 284. Fckl. *Fungi Rhen.*, No. 1135.

On rotten wood. Epping.

Sporidia ($\cdot 0007$ in.) $\cdot 02$ m.m. long, whereas in *B. sarcoides* they are only half that length. The cups exceed 1 inch in diameter.

Dothidea filicina. Fr. Cooke's "Handbook of British Fungi," No. 2427.

The description of the fruit in the work above quoted is erroneous, as I find upon re-examination. It should be as follows:—

Asci elliptical; sporidia biseriate, broadly fusiform, straight or curved, 3-5 septate, constricted, with a short apiculus at either end, amber-coloured, $\cdot 0014$ in. long.

Nectria citrino-aurantia. Lecr.

Cæspitose, pale orange; perithecia very minute.—Lecr. in *Desm. exs. ii.*, No. 778. *Rabh. Fung. Eur.*, No. 325. *Tul. Sel. Fung. Carp. Vol. iii.*

On sticks. Batheaston (C. E. Broome).

Remarkable for the exceedingly minute perithecia.

Sphæria (Pertusæ) pædida. B. & Br.

Perithecia ovate, rugose, opaque, free, brownish-black; ostiolum conical, at length deciduous; asci linear; sporidia uniseriate, contracted in the middle.—B. & Br. *Ann. N. H.*, No. 1396, pl. x., f. 13.

On beech. April.

Quite superficial, confluent; sporidia $\cdot 0005$ – $\cdot 0006$ in. \times $\cdot 0002$ – $\cdot 0003$ in.

[Plate 22, fig. 5—*a*, ascus with sporidia; *b*, sporidia.—B. & Br.]

Sphæria (macrospora) Scirpi. Fckl. (*Grevillea*, ii., p. 48.)

On *Typha*. May.

Sphæria (Immersæ) nigrofactæ. Cooke.

Gregarious, on blackened spots. Perithecia globose, opaque black, rough, immersed or semi-immersed, ostiolum thick, prominent, sometimes alone appearing above the surface of the matrix; asci cylindrical, tetrasporous, sporidia linear, multiseptate, yellowish. Paraphyses slender, hyaline, simple.

On old cabbage stems. Eastbourne (C. J. Muller). April.

Allied to *Sphæria bacillata*, C., but perithecia nearly double the size, the sporidia are not much more than half as long ($\cdot 0045$ in.) and appear to be always limited to four in an ascus.

SCHIZOTHYRIUM. Desm.

Perithecia sessile, simple, rather fleshy, rounded or ovate, flattened or slightly convex, minute, punctiform, dehiscing by a longitudinal fissure; nucleus gelatinous; asci fixed, erect; sporidia ovoid.—Desm. *Ann. Sci. Nat.* (1849), xi., 360.

Schizothyrium Ptarmicæ. Desm.

Innate, black, somewhat shining, rounded or ovate. Asci cylin-

dricul, or somewhat clavate; sporidia minute, ovoid.—*Desm., Ann. des Sci. Nat.* (1849), *xi.*, 360. *Labrella ptarmicæ*, in *Grevillea*, *ii.*, 57.

On *Achillea Ptarmica*.

Sphinctrina coremioides. *B. & Br.*

Perithecia stipitate, globose, externally setulose; hymenium downy from the projecting paraphyses; asci linear, soon absorbed; sporidia globose, concatenate.—*B. & Br., in Gard. Chron.*, 1872, *p.* 40, with *fig.* *B. & Br. Ann. N. H.*, No. 1398.

On pear roots. Painswick. Nov.

Sporidia $\cdot 00025$ in. $\cdot 006$ m.m. diam., forming chains at the tips of the elongated pedicels of the asci, which are soon absorbed.

Phacidium radians. *Rob.*

Erumpent, black; receptacles minute, rounded, or oblong, globose, then flattened, solitary and scattered, or confluent in radiating lines; disc fuliginous. Asci clavate; sporidia oblong, straight, or slightly curved.—*Desm., in Ann. des Sci. Nat.* (1842), *xvii.* *p.* 116. *Rickx. Flor. Hand.* 1, *p.* 459.

On living leaves of *Campanula patula*. Summer. Near Worcester (*Edwin Lees*).

Sporidia ($\cdot 00035$ in.) $\cdot 01$ m.m. long.

Chaetomium rufulum. *B. & Br.*

Perithecia subglobose, cellular, rufous, springing from a thin mycelium; asci short, obtuse, sporidia eight, globose, granulate, biseriate.—*B. & Br. Ann. N. H.*, No. 1397, *pl. x.*, *fig.* 14.

On a paper box under a bell glass. April.

Sporidia when young, $\cdot 0004$ – $\cdot 0005$, mature, $\cdot 0007$ in. Perithecia globose, with a pointed apex, composed of about three rows of coarse cells, of a pallid ochre at first, attached by a few threads. Ostiolum (if any) very inconspicuous; asci mostly curved, obtuse at either end, the narrow base soon losing all signs of attachment and floating freely in the perithecium; sporidia spherical, strongly granulated, of a pale-brown tint, containing a small nucleus.

[Plate 22, *fig.* 6.—*a, b*, asci; *c*, sporidium.—*B. & Br.*]

Chaetomium glabrum. *B.* (Cooke "Handbook," No. 1934.)

Asci linear; sporidia globose, uniseriate, smooth, ($\cdot 0005$ in.) $\cdot 0127$ m.m. diam.—*B. & Br. Ann. N. H.*, No. 1397,* *t. x.*, *fig.* 13.

On the same matrix *Lycogala parietinum* occurs, and we have little doubt that it is a mere state of the *Chaetomium*. The asci are mixed up with yellow threads, and it is probable that, as in other *Chaetomia* they are often absorbed, leaving the sporidia free, and thus appearing to be the spores of a *Myxogaster*.

[Plate 22, *fig.* 7.—*a*, asci with sporidia and paraphyses; *b*, sporidia.—*B. & Br.*]

Ailographum vagum. *Desm.*

Receptacles innate-superficial, amphigenous, scattered, elliptic, ovate, or linear, simple or furcate, black, opaque, lips closely con-

nivent when dry, acute, asci elliptical; sporidia very minute, hyaline, oblong, simple.—*Desm. Ann. Sc. Nat.*, 2 ser., *xix.*, p. 362. *Duby, Hist.*, p. 38.

On dry coriaceous leaves, as holly, ivy, &c. Epping.

Perithecia scarcely visible to the naked eye.

A WORD MORE ON THE "AGUE PLANT."

By WM. ARCHER.

The appearance of a further notice of the "Ague Plant," so-called, in the preceding number but one of this Journal (No. 21, March, 1874), recalls attention to the former record of it communicated by Dr. Bartlett (No. 6, Dec., 1872, p. 95), and it, at the same time, reminds me of the Editor having been so good as to forward me, shortly after that occasion, some specimens of this supposed dreadful form of vegetation, bringing home to me as well the fact that, owing to many and various avocations, I had left over communicating to him the result of an examination, until, indeed, the matter had at last altogether escaped me.

Meantime I perceive by the number referred to (p. 141) that its identity has since been made out, and quite correctly, as simply *Botrydium argillaceum* (Wallr.), or perhaps better, *Hydrogastrum granulatum* (Linn.), Desv. Indeed, on reading over the original account of the "Ague Plant," as given from Dr. Bartlett in this Journal (p. 95, Dec., 1872), I could not but suspect that this was in fact the very plant (though he called it a "fungus") in which Dr. Salisbury believed he had discovered the "malarial essence," though I fancy there are few European observers who would not be disposed to acquit the little *Hydrogastrum* of being the "cause of the ague."

Nevertheless I might be excused some little trepidation and mis-giving on opening the little package containing the specimen, all the way from Iowa, fearing that concentrated within might be imported a very unwelcome visitant. It was, no doubt, a relief, and I certainly must own to have been quite reassured, even upon a mere inspection by the unaided eye, when I did summon courage to open the little box, to see the poor little *Hydrogastrum* sure enough, as I had previously conjectured, showing its little withered, depressed, and collapsed rounded fronds, dotted over the surface of the dry mud. With very little compunction I placed a specimen with some water under the microscope, and found it, as indeed the majority of the examples proved to be, in the condition described by Reinsch, of which I gave an extract in this Journal ("Grevillea," No. 7, Jan., 1873, p. 107), following Mr. Parfitt's communication on this plant (l. c., p. 103), that is showing the cell, here making up the whole "plant," densely filled with rounded, rather thick-

walled daughter-cells, due to the breaking up of the contents of the original individual, and destined themselves to produce young plants "in the following spring" (and to perpetuate the "ague"?). Indeed, the examination with a hand lens showed certain of the examples which had burst at the top filled with these rounded germs (like so many little eggs in a nest).

I would at once have communicated to the Editor the result of my examination, but that I had seen a reference to a paper published in the Regensburg "Flora" of 1868, purporting to contain a demonstration by Dr. Itzigsohn that *Hydrogastrum* after all was not an Alga, but a Lichen, or at least that its nature was debatable, as one was to gather from the title: "*Botrydium argillaceum*, Wallr., ob Alge oder Flechte?" and I desired to know what Itzigsohn had to say upon our plant, ere sending forward a note of what the "Ague Plant" had turned out to be. It will be borne in mind that Itzigsohn's statements could scarcely have had any reference to the new views as to the nature of Lichens propounded by Prof. Schwendener, lately discussed at considerable length, a *résumé* of which has appeared, and is being continued, in the "Quarterly Journal of Micros. Science." But the "Flora" was not then, and has only lately been, available in Dublin.

From his paper (l. c., p. 129), we are to gather that, the *Hydrogastrum* being so common in his region, Dr. Itzigsohn had long looked rather down upon it on that account, and had taken its structure for granted, by, as he mentions, merely squeezing the examples out upon a slide, in place of making sections; still the examination he had previously given had shown him the formation of zoospores, his record of which is quoted by Rabenhorst in his "*Flora Europæa Algarum Aquæ dulcis*," etc. (p. 265), and which seems to be confirmed by Parfitt (l. c.). It would seem, indeed, for so far Itzigsohn had this very plant in view, and that his foregoing statements about it are correct.

But Dr. Itzigsohn desired to repeat his previous observation as to the occurrence of zoospores in *Hydrogastrum*, and having received some examples of what he supposed to be this plant from Dr. Ruthe, obtained from another locality, he submitted them to examination. He now made vertical sections, and of these he gives a description, but no figures, promising a more enlarged account on a future occasion; but I am not aware if he ever fulfilled that intention. From that description it appears indeed abundantly manifest it was now not *Hydrogastrum* at all which he had before him, but a true lichen, though from an outward resemblance he at once comes to the conclusion that *Hydrogastrum* (*Botrydium*) must be no longer accounted an alga, but a lichen. A vertical section through the rounded plant itself indeed gave him an outward cortical or epidermoidal layer, composed of very delicate, distinctly organised rotundato—6-angular parenchymatous cells,

followed by a "chlorogonimic" gonidial layer enclosed in a spongy indistinctly cellular mass, whilst further inwards towards the middle there occurred an irregularly interwoven fibrous layer, some of the threads of which ended blind towards the hollow centre of the "Botrydium-plant." He went further, and amongst those examples of a chestnut-brown colour he detected apothecia, with 8-spored thecæ, paraphyses none, spores colourless, filled with delicate plasma, elongato-elliptic; furthermore he found spermogonia, with spermatia. But these examples did not satisfy Itzigsohn, and he obtained, through friends, from Frankfort and Eichstädt, examples fully developed, which, he says, satisfied him at last that the plant passing at home with him as Botrydium was but the undeveloped state of *Thalloidima vesiculare* (Hoffm.) Massal; (*Lecidea vesiculare*, Auct.). Still, he adds, he would reserve his final judgment until he succeeded in obtaining fresh material for the more exact examination of the common Botrydium form, though he could entertain but little doubt but that "the undeveloped Thalloidima is perfectly identical with the plant figuring amongst phycologists as *Botrydium Wallrothi*."

It appears, then, that Itzigsohn's statements were after all, in the present case, scarcely worth waiting for; it cannot be doubted that, though possessing some amount of outward resemblance, these are two plants essentially distinct—it would seem pretty certain that not even a Schwendener would claim Hydrogastrum as the "gonidia-former," in any modified manner, of "*Lecidea vesiculare*;" but whether Itzigsohn ever investigated the matter any further is unknown to me.

On reading over the more recent description of the "Ague Plant" communicated by Dr. Bartlett to the "Chicago Society of Physicians and Surgeons" (see "*Grevillea*," No. 21, March, 1874, p. 142), one sees how fairly it tallies with the known characters of Hydrogastrum (see also Parfitt in "*Grevillea*," No. 7, January, 1873, p. 103), but it is undoubtedly surprising how he and the American observers of the Society referred to (loc. cit.) failed to perceive the identity of the organism in question, one which finds a place in so many botanical text-books, both by figure and description, as well as on lecture-diagrams, as a noteworthy example of a single-celled independent plant, and at the same time endowed with the power to become copiously ramified, so to speak, "root," "stem," and aerial portion combined in one "cell" only. I venture to think it hardly less surprising to find this seemingly so passive and inert little chlorophyllaceous alga, met with, in suitable situations, all over Europe, gravely *tried and found guilty*, on so slender evidence, of being the atrocious "cause of the ague."

In the mud-samples so kindly forwarded by the Editor, there occurred some fragmentary examples of a plant wholly different from the foregoing—so small in quantity as to be quite invisible to the unassisted eye—but which disclosed itself amongst the *débris*

taken up along with the *Hydrogastrum*. This was a *Chthonoblastus*, Kütz. (*Microcoleus*, Harvey), and was most probably the same as *Ch. ærugineus*, Kütz. Just where one of these algæ would be found it would not be very surprising to meet with the other. Can this latter be chargeable with being the "cause of the ague?" It is wholly a different kind of alga from *Hydrogastrum*, without any point of homology or affinity therewith, except, perhaps, their common love for the damp clayey substratum afforded by the partial drying of the swamps, near which, unfortunately, from some occult cause, the "ague" is prone to hover.

ON *TORTULA BREVIROSTRIS*. (HOOK. AND GREV.)

By E. M. HOLMES.

While looking over some mosses, collected in the neighbourhood of Buxton by my enthusiastic bryological friend Mr. E. George, my attention was attracted by a specimen amongst them, evidently belonging to the aloid group of the *Tortulæ*, but which had a very short conical operculum, and upon further examination proved to have synoicous flowers, and, therefore, to belong to *T. brevirostris*, Hook. and Grev. Having reported the occurrence of this species as a British species to Mr. Mitten, he kindly pointed out that it had already been established as a British species, and as one new to science, in "Brewster's Edin. Journ. of Science," vol. i., p. 289, and that an excellent figure of it was given in the 2nd ed. of the "Musc. Britt.," Suppl. tab. ii.

The history of this interesting little moss is a curious one. It appears to have been first collected in 1799 by Swartz, by whom specimens were sent to Messrs. Turner and Smith under the name of *T. rigida*. His specimens were described by them, in 1804, as a variety of *T. rigida* having a short operculum. In 1824 Drs. Hooker and Greville having received specimens, which they considered to be identical with those of Swartz, from D. Stewart, Esq., collected on an old wall near Edinburgh, they established the moss as a new species under the name of *T. brevirostris*, and described and figured it in "Brewster's Edin. Journ. of Science," as above quoted. It was afterwards described, and an excellent figure given of it, in the 2nd ed. of the "Muscologia Britannica." Wilson, however, omitted it from the "Bryologia Britannica," published in 1855, referring Stewart's specimens to *T. rigida*, Schultz, and his statement has hitherto passed unquestioned.

Thinking, however, from the occurrence of this species in Derbyshire that Wilson might possibly have been mistaken, and having ascertained that Greville's original specimens were in existence, I obtained, through the courtesy of Mr. J. Sadler, permission to

examine the original specimen from which the drawings in the "Muscologia" and "Brewster's Journal" were taken.

The packet I received was labelled on the outside, in Dr. Greville's handwriting, "*T. brevirostris*," and contained two smaller packets, one of which had Dr. Greville's original drawing inside, and was labelled outside, "*T. brevirostris*, on an old wall opposite Parson's Green, Edinburgh, D. Stewart, Esq.;" and the other was labelled also, in Dr. Greville's handwriting, "*T. brevirostris*," but was marked inside "*T. rigida*, Jackdaw Crag, Durham, R. Spruce."

The specimen from Parson's Green consisted of a few immature setæ, one of which only was sufficiently advanced to show the short operculum. On this one I found synoicous flowers, which proved it to be the right species, and not *T. rigida*, Schultz, as stated by Wilson.

The specimens in the other packet from Spruce were *T. rigida*, Schultz, having dioicous inflorescence. The operculum was, however, rather shorter than usual in that species, which probably led Dr. Greville (to whom the synoicous inflorescence of *T. brevirostris* was not then known) to label it "*T. brevirostris*."

Hence it is probable that Wilson, owing to the meagreness of the specimen from Parson's Green, did not examine it, and taking for granted that the other specimen from Jackdaw Crag was rightly named by Dr. Greville as *T. brevirostris*, and, therefore, identical with the Parson's Green specimen, referred them both to *T. rigida*, Schultz. The honour of separating *T. brevirostris* as a distinct species, and of discovering it as a native of Britain, is, therefore, due to Drs. Hooker and Greville.

The description given in "Brewster's Journal," and in the 2nd ed. of the "Muscologia," states that the operculum is half the length of the capsule; while Br. and Schimper, in the "Bry Eur.," state that it is only one-third the length of the capsule. The plate in the "Muscologia" does not, however, correspond with the description in the text, the figure being excellent, and representing the lid as less than one-third the length of the capsule. The figure was drawn, as above stated, from the Parson's Green specimen, which accounts for its correctness; the description may, however, have been modified by the remembrance of the supposed *T. brevirostris* from Jackdaw Crag.

The character of the Derbyshire specimens, which agree well with the figure in "Muscologia," may be thus expressed:—

Tortula brevirostris, Hook. and Grev. Plants small, subgemmiform, in scattered patches; lower leaves roundish, ovate, obtuse, upper leaves lingulate; nerve thin; seta reddish, about $\frac{1}{2}$ inch long; capsule elliptical; lid obliquely conical, $\frac{1}{4}$ the length of the capsule; annulus broadish; teeth of the peristome twice twisted.

For the purpose of easily distinguishing the allied species, the following arrangement may perhaps be found useful:—

Capsule elliptical—*T. brevirostris*. Hook. and Grev. Lid short, conical; synoicous.

T. rigida, Schultz. Lid long subulate; dioicous.

Capsule cylindrical—*T. ambigua*, Br. & Sch. Capsule erect; dioicous.

T. aloides, Br. & Sch. Capsule inclined; dioicous.

T. brevirostris appears to prefer old moss-covered limestone walls; *T. rigida*, mudcapped walls in oolitic or magnesian limestone districts; *T. ambigua*, rubble heaps in chalk pits; *T. aloides*, clay banks; for it is in these localities that the species are respectively found to grow most luxuriantly.

For the excellent drawing accompanying this notice I am indebted to Dr. R. Braithwaite, whose kind assistance on this and former occasions I take this opportunity of gratefully acknowledging.

A full account by Mr. Mitten of the history of the group of *Tortulæ* to which *T. brevirostris* belongs will be found in the "Journal of Botany" for this month.

EXPLANATION OF PLATE XXIII.

1. Plants, natural size. 2. Capsules $\times 20$. 3. Operculum $\times 50$. 4. Part of annulus. 5. Vaginula and inflorescence. 6. Stem $\times 20$. 7. Leaves $\times 20$. 7a. Transverse section of a leaf. 8. Filaments from surface. 9. Areolation of margin at upper part. 10. Areolation of basal angle.

LICHENOLOGICAL MEMORABILIA, No. 5.

By THE REV. W. A. LEIGHTON, B.A. Camb., F.L.S., F.B.S. Ed.

On Lecidea Dilleniana (Ach.), and *Opegrapha grumulosa*, Duf.

Our venerable and venerated *confrère*, the Rev. M. J. Berkeley, in one of his excellent papers in the "Linnean Transactions," xxi., p. 149, remarks that "The illustrious Mycologist, Elias Fries, on more than one occasion expresses the far greater pleasure that he has experienced in ascertaining with complete certainty a single synonyme of the earlier writers than in discovering new species—a sentence which will meet a responsive echo in the approbation of most true lovers of science. There is indeed a great satisfaction in clearing up a point hitherto obscure."

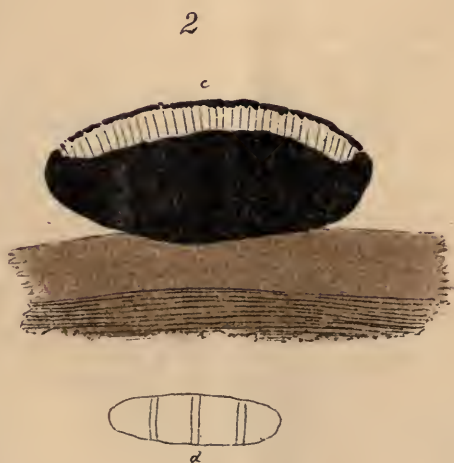
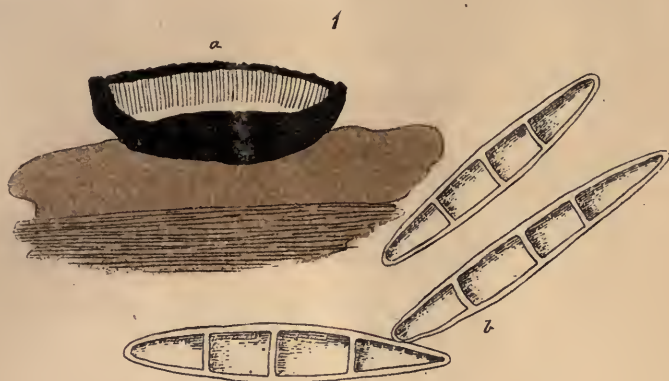
This excellent remark was forcibly recalled to my mind on examining some specimens of *Opegrapha grumulosa*, Duf., from the walls of the old Nunnery in Alderney, which had been determined by Dr. Nylander, and sent to me by Mr. Chas. Larbalestier, who has been the fortunate and acute discoverer of so many novelties in our Lichen-Flora, in the Channel Islands and elsewhere. This lichen is in general external character and aspect very similar to

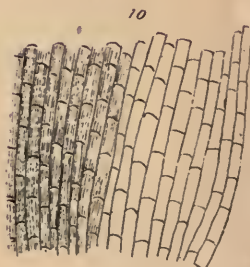
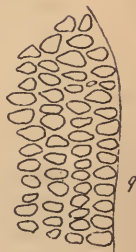
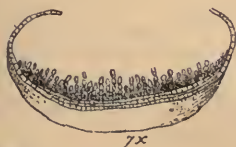
Lecidea Dilleniana, (Ach.), and has been often confounded with it in the published continental "Exsiccati." Attention, however, to the chemical reaction of the thallus and the size and form of the spores enables us distinctly to distinguish the two plants. In *L. Dilleniana* the reaction of the thallus is K yellow, C orange-yellow, and the spores are large, aciculari-fusiform, acute at the apices, and 3-septate (see fig. b.). In *O. grumulosa*, on the contrary, the reaction of the thallus is K very faint yellow, C decided red, and the spores less than half the size of those of *L. Dilleniana*, oblongo-fusiform or lineari-fusiform, obtuse or rounded at the apices, 3-septate (see fig. d.).

When describing *L. Dilleniana* in my "Lichen-Flora of Great Britain," &c., p. 332, I had never seen or examined a specimen of *O. grumulosa*, which at that time (1871) had never been detected as a British lichen, except in Jersey, by Mr. Larbalestier. Consequently whilst giving in the Lichen-Flora the proper reaction to *L. Dilleniana*, I mentioned in a note that the "Exsiccati" of Anzi Ven, 82 and 83, and Zwackh, 142 (respectively labelled as *L. Dilleniana*), and Schær., 580 (labelled as *Lecidea epipolia*), had a different reaction, viz., K yellow, C red. The present examination of authentic specimens of *O. grumulosa* now enables me to refer these to their proper place, viz., to *O. grumulosa*, and not to *L. Dilleniana*.

Much has been written time after time by various writers against chemical tests and their supposed variability, and this apparent diversity has no doubt resulted from similar circumstances with the above. But the above fact appears to my mind as an additional confirmation of their real value and constancy. In these investigations it will be advisable to bear constantly in mind the caution—a caution which cannot be too often repeated—which Dr. Nylander gives in "Journ. Linn. Soc.," ix., p. 365, note:—"The analyses of lichens made by chemists often fail through the neglect of an exact determination of the species, and probably not less often by the mixture of specimens confounded together; and incorrectly assigned to one single species. For the chemist, no less than for the physiologist, it is of the greatest importance to know exactly what is the plant we have under observation; that is, to have well determined the plant which we are studying." In other words, he must not place implicit confidence on the attached labels merely, from however great soever authority resulting, as indicating undoubted accuracy, nor on his own preconceived notions of the particular diagnosis; but by careful observation and comparison thoroughly satisfy himself that the plant under review is really that which the label indicates it to be. Then apply the chemical test, and doubt will be exchanged for certainty.

It affords no trifling pleasure to my own mind to acknowledge and correct the error into which, through ignorance and imperfect knowledge, I had fallen, and at the same time to adduce a confirma-







tion of the value of chemical reagents in accurately determining the species of lichens.

The following additions to the synonymy may be useful :—

Lecidea Dilleniana (Ach.) (K yellow, C orange).

GEOG. DISTRIB.—Sweden, Italy.

Exs.—Leight, 336. Mudd, 199.

Opegrapha grumulosa, Duf. (K faint yellow, C red).

Exs.—Zw., 142, 9, 144. Anzi Langob., 404. Anzi Venet, 82, 83. Schær., 580.

ENGLAND.—New Red Sandstone Rock, South Devon! *Prof. G. Dickie*.

As details of the two lichens have not been published, it may be advisable to introduce them here :—

EXPLANATION OF PLATE XXVI.

Lecidea Dilleniana (Ach.).—a. Section of apothecium. b. Spores magn. 1,200 times.

Opegrapha grumulosa, Duf.—c. Section of apothecium. d. Spore magn. 1,200 times.

SOME CRYPTOGRAMS FROM PIEDMONT AND NICE.

With a view to draw tourists' attention to new ground, the following slight notice of a few rarities is given, as the habitats of some do not appear to be localized. Collected in a hasty journey, one is induced to believe other noteworthy plants would be found in this region, the beauty of whose scenery and climate ought alone to induce a visit.

Collema Stygium. (*Delise.*) Krempelh. Bay, p. 94. *Synechoblastus Körb.* Parer. p. 418.

On elm and walnut, Cuneo (Coni) to Robillante. I have received this (*Saxicole*) from Mr. Joshua, Cirencester. Professor Anzi, in his "*Neosymbola Lich. Rarior. vel. nov. Italiae Superioris*, Milano, 1866, gives following habitats for this :—

"On limestone and dolomite in the Grisons Valleys, Lanzada Poschiavo."

Rhynchostegium 'praecox. *De Not.* Epilogo, p. 81. *Eurhynchium Strigosum* *β abbreviatum*, *B. E.* "Montibus di Tenda, sterile," Epilogo, p. 81.

A dense species, occurring on the Limone side of Col di Tenda, forming patches like the dense state of *Brachythecium Collinum*, *B. E.*, fertile June, 1873, in turfy hollows, wet with snow water, although the Col is only some 6000 feet high.

Desmatodon obtusifolius. *D. N.* Epilogo, p. 576. *D. flavicans.* *B. E.*

"In Montibus di Tenda, secus viam, Julio, 1839, legit celeb. cesati." What appeared to be this, but old and barren, was by road side on south-west side of summit of Col. Being out of season, one could only judge from the obtuse leaves that resemble the American specimens of true *D. flavicans*.

Omphalaria cyathodes. MASS.

On vertical shady rock faces, Val di Tenda. A peltate, umbilicarioid, highly singular plant, that I thought *O. Notarisii*, D. N. *O. helvelloidea*, Mass. Probably same as *Collema Elvelloidea*, Ach. Synopsis, 1814, p. 318; the description of which appears very applicable to my plant. Professor Anzi's exquisite 'Lichen Flora of Como,' "Catalogus Lichenum, &c., 1860," gives several habitats for *O. Notarisii*, D. N., near Como.

Grimmia Tergestina. Tommasini.

Rocks, Val di Tenda. This beautiful plant, so well marked by its membranous perichaetial leaves, is, as De Notaris well remarks, "ad Grimmiam leucophæam, quadantenus accedens, distinctissimus," a new habitat.

In the vicinity, on the rocks, were *Thalloidima mamillare*, Gonan, and the charming *Fabronia pusilla*, Raddi, investing the chinks of the rocks with a delicate lining, and the bases of the rocks lined for miles with a dense mat of *Adiantum capillus veneris*, while about *Cineraria maritima* was extremely common.

Trichostomum diffractum. Mitten. Seeman's "Journal of Botany," 1868, p. 98.

Cited by Dr. Braithwaite as same as *Tortula nitida*, Ldbg., but the locality cited by both authors, "Shoreham, Sussex, Nowell," yields only *Trichostomum flavovirens*, B.E., and *Tortula squarrosa*, D. N., both of which Nowell gathered with the writer. *Trichost. diffractum*, Mitten, does not occur in Sussex. Rocks, Val Sant Andrea, near Nice, furnish the veritable species, identical with specimens from Plymouth, Devon, where it is extremely common. At Val S. Andrea it grows near *Trichostomum crispulum* and *Gymnostomium calcareum*.

Grimmia crinita. B.E.

Extremely common on walls, valley of the Paglione, Nice.

I am much indebted to Mr. Baker, of Kew, for, in the kindest manner, helping me as to names of Collembata.

Brighton, March, 1874.

GEO. DAVIES.

TORTULA SINUOSA, IN WARWICKSHIRE.—It may interest Bryologists to know that I find this moss in Warwickshire. On the mortar of a brick bridge, near Wootton Warven: in this habitat small, apparently starved; also near Fenny Compton, on an old tree stump, the plants in this locality being robust; in both habitats, however, barren. *Pottia cavifolia* is not confined to oolitic soils, as I find it abundantly on mud-capped walls, at Harbury, Fenny Compton, Kineton, Wilmeccote, and on marly banks at Bearley; all these localities are on the lias and are all in South Warwickshire. The form I find at Wilmeccote seems to be typical, whilst at Harbury and the other localities the piliferous form appears to prevail.

J. BAGNALL.

CALLITHAMNION HORMOCARPUM.

By E. M. HOLMES.

A note having appeared in this journal stating that *Callithamnion hormocarpum* should be referred to *Callithamnion versicolor*, it may perhaps be well to point out the difference between *Callithamnion hormocarpum* and the nearly allied species.

Through the kindness of Prof. Agardh, who has sent me authentic specimens of *C. versicolor*, I have been enabled to examine that species, and find that it is entirely distinct from *C. hormocarpum*, which is much more nearly allied to *C. roseum*, *byssoides*, and *Seirospora Griffithsiana*.

In *C. versicolor* the plumules are distinctly and repeatedly forked, the pinnules ending in two short, equal, and nearly parallel cylindrical cells. In appearance the plumules are truncate and penicillate, owing to the densely corymbose branching at the tips. It seems to be merely a variety of *C. corymbosum*, having a more marked central rachis to each frond.

In *Callithamnion hormocarpum* the plumules are not forked, but alternately pinnate, and the tips never end in equal forks, but the pinnæ are pinnate, with a slightly flexuous rachis, which gives the pinnules the appearance of being distantly forked, as in *Seirospora*.

In appearance the plumules are never truncate or penicillate, but have a lanceolate outline, and are distantly branched.

C. roseum.—The plumules are much more densely clothed with pinnæ, and have a somewhat truncate, but never penicillate, appearance; the pinnules are longer and less branched, and are without the peculiar cells on the joints, and the tufts of seirospores, present in *C. hormocarpum*.

C. byssoides.—The plumules are much more densely tufted than in *C. hormocarpum*, and the pinnules are corymbose and more slender.

Seirospora Griffithsiana has the seirospores always on the tips of the plumules; *C. hormocarpum* always on the rachis of the plumules, never at the tips, and I have not observed in *Seirospora* the peculiar cells on the joints which are present in *C. hormocarpum*. In some specimens of *C. hormocarpum* which I have recently examined, these marginal cells appear to have split longitudinally into four parts, but not in a tripartite or cruciate manner as is usual with tetraspores.

BRITISH HEPATICÆ.—The announcement that the first part of Dr. Carrington's long-promised work is ready, will be gratifying to some of our readers. It is uniform with the last edition of Sowerby's "English Botany," and is issued by the same publisher (Hardwicke).

Hypoxyton marginatum. *Schw.*—A singular illustration of the wide distribution of some species of fungi was discovered the other day in examining two fragments of *Hypoxyton* on some bark from Lagos, W. Africa. One of these was the above-named, which occurs in Britain, the United States, Venezuela, Cuba, and now in West Africa. The other very characteristic species appears to be undescribed.

Peziza vesiculosa. *Bull.*—Dr. Rehm has issued in his "Ascomyceten" specimens of a *Peziza* which he calls by this name, but which is evidently quite different from Bulliard's species. It is unnecessary to enumerate here all the differences between this, which we have named *Peziza Tarzetta*, and the much larger, more sessile species found in this country; meanwhile, we note the correction.

CRYPTOGAMIC LITERATURE.

QUELET, L. Les Champignons de Jura et des Vosges. 2nd part. Paris, 1873. [It is much to be regretted that the plates are so indifferent.]

BRAITHWAITE, Dr. R. On Bog Mosses, No. 4. *Sphagnum acutifolium*, Ehr., and its varieties, with two plates, in "Monthly Microscopical Journal," for April, 1874.

TAYLOR, T. On the Fungus of the Hawthorn (reprint), in "Monthly Microscopical Journal," for April, 1874.

ARCHER, W. Notice of a new species of *Spirogyra*, described by O. Nordstedt, in "Journ. Bot.," Ap., 1874.

SMITH, W. G. Review of Part I. of Icones Selectæ Hymenomycetum Hungariæ, in "Journ. Bot.," April, 1874.

KREMPELHUBER, A. v. Chinesische Flechten, in "Hedwigia," No. 3, 1874.

NORDSTEDT, O. Desmidiaceæ ex insulis Spitzbergensibus, &c., collectæ, in "Hedwigia," No. 3, 1874.

RABENHORST, Dr. L. Fungi Europæi, Cen. xviii.—species enumerated in "Hedwigia," No. 3, 1874.

NYLANDER, W. Animadversiones circa Spruce Lichenes Amazonicos et Andinos, in "Flora," Feb., 1874.

BARY, A. DE. On Protomyces microsporus and its allies, in "Bot. Zeitung," for Feb., 1874.

HAMPE, E. New Mosses from Madagascar, in "Linnæa," for Sept., 1873.

OUDEMANS, C. A. J. A. Aanwinsten voor de Flora Mycologica van Nederland, in "Nederlandisch Kruidkundt Archief," 1873, with plates.

BREFELD, OSCAR. Botanische Untersuchungen über Schimmelpilze, 2 Hft. *Penicillium*, with 8 plates. Leipzig, 1874.

Grevillea,

A MONTHLY RECORD OF CRYPTOGAMIC BOTANY
AND ITS LITERATURE.

NOTICES OF NORTH AMERICAN FUNGI.

By the REV. M. J. BERKELEY, M.A., F.L.S.

(Continued from Page 157.)

402. **Sphæronema pruinsum.** B. & C.—*Erumpens cylindricum apice globosum*; *sporis oblongis hyalinis*.

On *Rhus venenatus*. Pennsylvania, Michener. No. 3492.

Cylindrical. Bursting through the bark with its globose head, pruinose with minute conidia, punctate below; spores oblong, .0007-.001 long.

402 (bis). **Sphæronema radula.** B. & C.—*Erumpens conicum compressum*; *apice truncatum*; *sporis brevibus fusiformibus hyalinis uniseptatis vel endochromate utrinque retracto*.

On twigs of *Acerrubrum*. Car. Inf. No. 1088.

Erumpent conical, compressed, often truncate at the apex, which is of a pale rose colour from the shortly fusiform hyaline uniseptate spores, or with the endochrome retracted at either end.

403. **Sphæronema Ampelopsidis.** B. & C.—*Gregarium nigrum ostiolo tenier erumpens*; *sporis oblongis hyalinis minutis*.

On twigs of *Ampelopsis quinquefolia*. Mountains of Virginia. No. 3316.

Bursting through the bark by means of its delicate ostiolum, and at length throwing it off entirely, so as to leave a little patch of perithecia; spores oblong, minute, seated on pedicels of about the same length.

403 (bis). **Sphæronema spina.** B. & R.—*Peritheciis erumpentibus spiniformibus nigris corticatis*; *sporis minimis globosis*. *Sphæria Spina*, Schwein. *Sphæronema acuminatum*, B. & R. *S. Spinæ-forme*, B. & C.

On dead leaves of ash, accompanied by young *Tillandsia Usneoides*. Car. Inf. Ravenel. No. 1447. Alabama, Beaumont. No. 5118.

Bursting through the bark by its spiniform often inclined ostiolum, covered with a thick bark; spores globose, very minute.

404. **Sphæronema Rhoidis.** *B. & C.*—Peritheciis sparsis vel congestis minoribus subcylindricis erumpentibus.

On branches of *Rhus copallina*. *Car. Inf. No. 233.*

Much resembling the last, but very much smaller, and with the perithecia often crowded. Unfortunately no fruit has been found.

404 (bis). **Sphæronema macrosporum.** *B. & C.*—Subcylindricum basi parce dilatatum; sporis longis filiformibus flexuosis, 7-8 septatis coronatum.

On twigs of *Robinia*. *Car. Inf. No. 3283.*

Perithecia cylindrical, slightly thickened at the base formed of elongated cells, crowned with the radiating thread-like curved 7-8 septate spores.

405. **Sphæronema seriatum.** *B. & C.*—Peritheciis majoribus subcylindricis transversim seriatis apice collâpsis; sporis filiformibus estrato pallide brunneo oriundis.

On birch. Massachusetts. *C. J. Sprague. No. 4896.*

Bursting transversely in rows through the bark; perithecia rather long, collapsing above, outer walls red-brown under the microscope, lined with a pale brown stratum, from which spring the hyaline slender-waved spores which are three times as long as the pale brown sporophores.

405 (bis). **Sphæronema Robiniæ.** *B. & C.*—Peritheciis liberatis subglobosis ostiolo brevi truncato primum pruinoso; sporis hyalinis oblongis utrinque obtusis.

On branches of *Robinia* and *Tilia*. Virginia Mountains. *No. 3309.* On lime. *No. 3331.*

Perithecia at length free, subglobose, with a short truncate ostium, at first pruinose; spores oblong, hyaline, .0006 long, obtuse at either end.

406. **Sphæronema nitidum.** *B. & C.*—Peritheciis conicis truncatis; sporis oblongis vel clavatis hic illic uno apice attenuatis binucleatis.

On twigs of *Acer Negundo*. Carolina. *No. 6388.*

Perithecia conical, truncate, bursting through the cuticle, sometimes surrounded by a dark line, resembling those of a *Sphæria* of the tribe *Pertusæ*; spores oblong or clavate, .0004 long, binucleate. In many respects resembling the last, but the spores are different.

406 (bis). **Sphæronema populi.** *B. & C.*—Peritheciis conicis quandoque congestis; sporis breviter fusiformibus hyalinis.

On bark of *Populus monilifera*. *No. 5872.*

Perithecia conical, scattered, or congested, more acute in the last, but sometimes cylindrical; spores hyaline, shortly fusiform, .0004 long.

407. **Sphæronema subtile.** *B. & C.*—Hysteriiforme; sporis minutis oblongo ellipticis.

On pine wood. Massachusetts. Russell. *No. 5462.*

Perithecia minute, hysteriiform, obtuse; spores oblong, .00025 long, under a high magnifier surrounded with a broad hyaline border.

* **Sphæronema rufum.** *Fr.*—On bark of *Magnolia glauca*. *Car. Inf.* No. 4923.

Spores extremely minute, with molecular motion.

* **Sphæronema glomeratum.** *Mont.*—On oak twigs. *Car. Inf.* No. 725.

Sporophores with a few short branches above; spores minute, shortly oblong.

407 (bis). **Sphæronema viticola.** *B. & C.*—Peritheciis gregariis quandoque congestis erumpentibus conicis tate truncatis; pulverulentis parietibus crassis.

On branches of Vine. *Car. Inf.* No. 1408.

Gregarious, or occasionally almost connate, erumpent; perithecia conical, widely truncate, with thick walls, pulverulent. Immature; allied to the last.

408. **Sphæronema Sambuci.** *B. & C.*—Peritheciis sparsis erumpentibus obtusis; sporis minutis oblongis curvulis; sporophoris ramosis.

On branches of Elder. *Maine, Rev. J. Blake.* No. 6298.

Perithecia erumpent, scattered, obtuse; spores minute, sausage-shaped, sporophores branched as in *Sphæronema glomeratum*. No. 5040. *Car. Sup.* appears to be a smaller form.

* **Darluca filum.** *Cast.*—Parasitic on various uredines. On *Smilax*. *Car. Inf.* No. 1511. On *Juncus dichobomus*. *Car. Inf.* No. 3214.

On clover. *Massachusetts.* No. 3384. On *Pycnanthemum*. *Mountains of New York.* No. 4429. On *Viola pubescens*. *Pennsylvania, Michener.* No. 4831. On Tea. *Alabama, Beaumont.* No. 4664. On *Cyperus*. *Car. Inf. Ravenel.* No. 1656. On *Lespedeza*. *Car. Inf.* No. 2084. On *Rhyncospora*. *Florida.* No. 757.

408 (bis). **Sphæropsis anomala.** *B. & C.*—Peritheciis sparsis nudis hemisphericis sporis magnis obovatis e pedicellis simplicibus vel furcatis oriundis.

On dead wood. *Car. Inf.* 1790.

Perithecia superficial, scattered, minute hemispherical; depressed, minutely granulated; spores obovate, .013 long, springing from hyaline pedicels which are simple or forked below. In one case the spore was lemon-shaped, and in a young spore the endochrome was retracted to either end. Clearly allied to *S. placenta*, *B. & C. Linn. Journ., x., p. 352.*

409. **Sphæropsis hyalina.** *B. & C.*—Peritheciis epidermide subtectis; sporis ellipticis hyalinis.

On twigs of *Ribes rubrum*. *Pennsylvania, Michener.* No. 4093.

On *Viburnum dentatum*. No. 4208. On *Fraxinus Americana*. No. 4201.

Perithecia almost entirely concealed by the cuticle forming little papillæ; spores exactly elliptic, $\cdot 001\text{--}01\frac{1}{2}$ long, hyaline. There are multitudes of specimens from various quarters which either belong to one common species or are mere conditions of *Diplodia vulgaris*, Lév. All are no doubt mere states of *Sphæria* or allied ascomycetous genera, the spores varying slightly in size. It is not thought worth while enumerating them.

409 (bis) **Sphæropsis tephrospora**. B. & C.—Peritheciis subcor-tice nigrifacto, tectis, sero rima longitudinali emergentibus, sporis brunneis ellipticis vel oblongo-ellipticis uninucleatis.

On twigs of *Magnolia*. Car. Inf. No. 5013.

Perithecia at first quite concealed, then partially exposed by the splitting of the cuticle, at first presenting a pallid disc; spores elliptic or oblong elliptic uninucleate, $\cdot 00025$ long, about half as much wide, with a central nucleus.

410. **Sphæropsis parasitans**. B. & R.—Peritheciis minutis sparsis papillæformibus; sporis ellipticis binucleatis.

On some *Hypoxydon*, of which perhaps it is a mere condition. Cotoosa springs, Ravenel. No. 1745.

Perithecia minute, scattered papillæform; spores elliptic, brown, with two nuclei, $\cdot 000\frac{1}{2}$ long, about half as much wide.

410 (bis). **Sphæropsis micromegala**. B. & C.—Peritheciis hysteriiformibus minutis nitidis, sporis ellipticis hyalinis.

On naked roots of pine. Alabama, Beaumont. No. 5090.

Perithecia minute, hysteriiform, shining; forming little linear patches, the fibres of which are bleached; spores elliptic, with one side less arched, $\cdot 001$ long, hyaline, rather more than half as much wide.

411. **Sphæropsis dryina**. B. & C.—Peritheciis papillæformibus epidermide cinctis; sporis obovatis hyalinis.

On twigs of oak. Pennsylvania, Michener. No. 4139.

Perithecia papillæform, surrounded by the cuticle, which gives them a pale appearance; spores obovate, $\cdot 0006$ long, about half as much wide, hyaline.

411 (bis). **Sphæropsis Pennsylvanica**. B. & C.—Peritheciis papillæformis epidermide cinctis; sporis oblongo-obovatis hyalinis.

On branches apparently of elder. Pennsylvania, Michener. No. 3963.

Perithecia minute, gregarious papillæform, surrounded by the cuticle, the bright black apex only penetrating; spores oblong-obovate, $\cdot 001$ long, with one or sometimes two nuclei. *Sphæropsis stenosporas*, B. & C., on peach, Pennsylvania, Michener, No. 4233, may be considered as a variety. The spores are the same; but rather darker.

* **Sphæropsis atrovirens.** Lév.—On Mistletoe. Car. Inf. No. 3697, 2707.

412. **Sphæropsis mamillaris.** B. & C.—Peritheciis sparsis vel congestis mamillæformibus; sporis oblongo-obovatis hyalinis.

On twigs of *Gleditsia*. Car. Inf. No. 3414.

Perithecia scattered or collected in groups, mamillæform surrounding the cuticle; spores oblongo-obovate, hyaline, .0006 long, about $\frac{1}{3}$ as much broad; perithecia much larger than in the last, but the spores are smaller and narrower.

* **Sphæropsis Candollei.** B. & Br. (*Sphaeria Buxi*, D.C.)—On leaves of box. Car. Sup. No. 6469.

412 (bis). **Sphæropsis elongata.** B. & C.—Peritheciis minutis nitidis sparsis ostioli brevi emergentibus; sporis subfusiformibus enucleatis; sporophoris sursum attenuatis.

On *Gladiolus*. Alabama, Peters. No. 5231.

Perithecia minute, piercing the cuticle by the distinct ostiolum; sporophores attenuated upwards, spores oblong, subfusiform, .001-.0008 long, without any nucleus, $\frac{1}{5}$ th or $\frac{1}{6}$ th as much wide.

413. **Sphæropsis macrospora.** B. & C.—Peritheciis in massam communem congestis; sporis elongatis subfusiformibus.

On twigs of *Coriaria myrtifolia*. Pennsylvania, Michener. No. 4162. On *Magnolia glauca*. Alabama, Peters. No. 4606. On *Sambrecur Canadensis*. Pennsylvania, Michener. No. 4305.

Perithecia crowded into a common mass, which is flattened above; spores elongated, subfusiform, with one side less curved, or slightly clavate, as in No. 4606, enucleate, .001-.0016. In No. 4305 .0015.

413 (bis). **Sphæropsis fusiger.** B. & C.—Peritheciis sparsis apice lateritiis; sporis subfusiformibus enucleatis.

On twigs of *Mespilus*. Pennsylvania, Michener. No. 4056.

Perithecia scattered, covered at the emergent apex with red granular matter; spores fusiform, with one side less curved, .0015 long, enucleate. The spores closely resemble those of the last species, but the habit is quite different.

414. **Sphæropsis marginata.** B. & C.—Peritheciis tectis ocellatis; sporis fusiformibus elongatis angustis brunneis.

On leaves of *Yucca*. Car. Inf. No. 6184.

Perithecia scattered, concealed by the cuticle, which is black on them by translucence, but white in the centre; spores narrow, fusiform, .001 long, about $\frac{1}{6}$ th or $\frac{1}{7}$ th as much broad.

414 (bis). **Sphæropsis cymbæspora.** B. & C.—Peritheciis sparsis obtusis epidermide ciuctis; sporis cymbæformibus endochrome utrinque retracto.

On twigs of *Vaccinium*. New England, Russell. No. 5930.

Perithecia scattered, slightly projecting, almost covered by the cuticle, very obtuse; spores cymbæform, .006 long, pale green, the endochrome retracted to either end.

REMARKS ON A PAPER PUBLISHED (JAN., 1874) BY
DR. W. NYLANDER, IN THE "FLORA," AND
LATELY RE-ISSUED IN "GREVILLEA."

By H. A. WEDDELL, M.D., F.M.L.S.

Few among those who have passed some part of their life in botanical pursuits, and more especially in the study of Lichens, can boast of having committed even but a small amount of errors. I for one have to confess many such, but I may candidly say that I have always felt grateful to fellow botanists who have advised me of them, provided they have done so in a friendly or courteous manner. So much *à propos* of a Latin article, from the pen of the celebrated lichenologist, Dr. W. Nylander, translated some weeks since into this Journal.* Shortly after its appearance in the "Flora" it was handed over to me by a friend of mine and the author's; and as it struck me that some passages quoted in it from my two last lichenological brochures† had been misunderstood by my learned critic, or wrongly dealt with, I took the liberty of writing to him on the subject, fully expecting then to hear no more about the matter. Dr. N. having, however, thought proper, notwithstanding, to have his paper re-edited for the readers of this Journal, I have on my part thought it expedient to lay before them some of the remarks which its perusal had suggested to me, noticing by the way that they are, for the most part, extracted from the letter above alluded to.

I.—LICHENS DU MASSIF GRANITIQUE DE LIGUGÉ.

1°. (Nyl. l. c., p. 57.) *Hic primo invenimus*, p. 5, *hæc verba*: "Recent observations, by introducing to our notice the singular relations which appear to exist between Lichens and Algæ," etc.—Dr. N. takes occasion from these words to develop his opinion on Schwendener's Algo-Lichen theory, taking it for granted I must be, *meo modo*, an adherent to it. The truth is, that in the face of many facts lately adduced, especially by M. Bornet, it is difficult to deny that many Lichens during the first stage of their life are connected parasitically with some of the inferior Algæ. At a later period, however, when the Alga, assuming the form of Gonidia, becomes included within the tissue of the Lichen, the connection,

* It is scarcely necessary to state here that, in writing these and the following lines, I have not had the slightest pretension to put my experience in lichenology (hardly of six years' standing) upon a parallel with that of Dr. Nylander, whom the Rev. W. A. Leighton, in one of his late publications, has called the "*facile princeps* of modern microscopic botanists." I cannot, though, refrain from saying how deeply I regret that one whom I had been accustomed for so many years to consider as a friend, and look up to as a master, should have thought it needful, on account of some variance of opinion on scientific matter, to treat me so much like an enemy, and oblige me to act in self-defence.

† "*Lichens du Massif Granitique de Ligugé*," and "*Nouvelle Revue des Lichens du Jardin public de Blossac, à Poitiers*."

if still kept up, can hardly continue to be considered as parasitical.*

2°. (Nyl. l. c., p. 58.) *Eadem pagina legimus*: "It has been repeatedly stated that Lichens live exclusively, or almost exclusively, at the expense of the atmosphere; but it stands for itself that the rain-water which periodically impregnates them, and which serves as a vehicle for very many diverse substances which a crowd of accidental circumstances may have brought upon the spot, contributes at least an equal part of their nutrition."—*Unde* (exclaims Dr. Nylander) *auctor hæcce sic exacte (et quidem proportionibus) cognita habet?* Now, if my eminent censor had read the above quoted paragraph with due attention he would easily have convinced himself that it contained no mention whatever of "exact proportions;" it merely expresses that Lichens derive a greater proportion of nutriment from rain than from the naked air. And the words "it stands for itself" imply clearly enough that, in my conception, those who had spoken of the atmosphere as the main instrument of Lichen nutrition must necessarily have comprised "rain." My very reason for insisting upon the importance of rain-agency was for the purpose of making it understood that rain-water and dew served likewise as vehicles for very many organic and inorganic substances brought by "accidental circumstances" within the proximity of the plant subject to be impregnated by them.

3°. (Nyl. l. c., p. 61.) *Porro*, p. 6, *animadvertatur*: "Silicicole Lichens which occur exceptionally upon calcareous rocks of sufficient hardness, but never upon organic substrata." The word "never" used in this sentence is evidently rather too strong. I ought to have said, "never, or almost never." Be it however remarked, that this assertion was not founded on my personal experience alone, but also on that of several classical authors, whose books were before me; such, for instance, as Acharius, Fries, Nylander, and others. Now, as no one of these authors mentions the circumstance of *Lecidea contigua*, for instance, growing on an organic substance, I thought it not unreasonable to assume that it was not to be found there. Dr. N., however, tells us that it is, as well as other species mentioned by me along with it.† The rarity of the fact alluded to is, however, almost tanta-

* When Mr. N. says (l. c.): *Fieri nequit organum (gonidia) simul esse parasitam corporis, cuius partes vitales agit*," he seems as if he thought Schwendenerists considered the Alga (gonidia) as living parasitically on the substance of the Lichen; whereas they believe, I fancy, just the contrary. As regards Dr. N.'s special objections to an Alga-Lichen hypothesis, I do not see that they are in any way conclusive, not one of them really coming to the point. They prove undoubtedly the importance of gonidia as instruments (I dare not say organs) of lichen nutrition, but do not, I find, in any manner demonstrate that true Gonidia are not Algæ. Dr. N. very correctly remarks, on the other hand, that there has been in more than one instance a confusion made between genuine Algæ and plants that bear more or less resemblance to them, also with what he calls *Pseudo-Algæ*; all which, according to his investigations, ought more appropriately to be referred to the class of Lichens.

† *Lecidea geographica* has, I know, been gathered once or twice in the Pyrenees, on the stem of *Rhododendron ferrugineum*.

mount to its non-occurrence, and does not, I believe in any way interfere with the differences I have pointed out as being observable in the *natural* stations of saxicole lichens.

4°. (Nyl. l.c.) *Ibidem in nota adest*: "Oxalate of lime constitutes . . . one of the essential characters of this class of plants." *Error est hocce*, etc. I must here beg leave to observe that, owing to the curtailment of the passage quoted from my *brochure*, I am made to endorse the responsibility of an opinion which is not mine, and which I have nowhere expressed as such. The quotation ought to have been given as follows: "constitutes, according to several modern authors, and according to Dr. Nylander, one of the essential characters," etc. My motive for especially mentioning here Dr. N.'s name, arose from a very natural interpretation of the following paragraph of his *Synopsis Method.*Lich. omn.*, p. 4.: "Les Lichens possèdent en outre, parmi leurs principes immédiats, un élément caractéristique, facile à reconnaître, l'oxalate de chaux, dont les cristaux octoédriques se trouvent, à ce que je crois, dans tous les thalles."

II.—NOUVELLE REVUE DES LICHENS DU JARDIN PUBLIC DE BLOSSAC.

5°. (Nyl. l.c.) *Quoad Lichenes horti publici "Blossac," comparatos cum notula mea circa hortum "Luxembourg,"* etc.—Dr. N. here objects to my comparing the Lichen-flora of the public garden of Blossac, in Poitiers, to that of the Luxembourg, in Paris, on the ground that the vegetation of the former of these localities is too analogous to that of the rural tracts bordering upon it. This difference in the relative situation of the two public walks had appeared to me, on the contrary, to be precisely what was suited to give some interest to the comparison of their respective floras, and I may add that it was for the very same reason that I compared the Luxembourg garden, as respects lichens, to that of the more central Tuileries; these, again, to the London parks; and, lastly, the side of the garden of Blossac which is hemmed in by dwelling-houses, to that which adjoins the open country.

6°. (Nyl., p. 62.) *Circa reagentia chemica invenimus*: "the truth is, an experience of many years permits me to affirm it, that there are some things in the new method that are worth keeping, and others that may be laid aside." *Expectemus et experientia auctoris discamus*, etc. In this part of Dr. Nylander's paper, I am found fault with for not having more precisely stated what I considered to be the defects of the very useful and practical method of diagnosis for which we are indebted to this laborious and acute lichenist. The reason I have to give for the omission, if it be one,* is, however, a very simple one, and I am surprised Dr. N. did not

* For, while combating, in my *brochure*, what I think exaggerated criticisms of Dr. N.'s method, I nevertheless clearly acknowledge the existence of "a certain number of dubious results."

at once detect it—for my wish was to defend the method, as far as I deemed it practicable, and therefore it could scarcely be expected that I should set forth arguments that would have produced a contrary effect.

7°. (Nyl. l. c.) P. 16, *legitur*: “I have seen in some apothecia of this variety or of the following, the normal spores of *Lecanora subfusca* replaced by spores in equal number of an entirely distinct physiognomy, etc. M. Nylander, to whom I submitted the parts, hesitated to pronounce upon the possible causes of such an anomaly.” *Hic experientia auctoris minime splendescit. Mihi quidem submiserat*, etc.—I have nothing to object to this, being quite confident that I committed the blunder attributed to me. The so-called anomalous apothecia were undoubtedly, as Dr. N. states, nothing else but those of a *Physcia* accidentally intermingled with those of the *Lecanora*, and seeming to arise from the same thallus. I cannot, however, omit remarking* that, as regards Dr. N.'s answer to my letter on the above case, his memory must certainly have failed him, for his translation of the passage concerning it, by the words: “*Hocce miraculum est, nihil tam prodigiosum novi*,” is anything but *fidissima*. Indeed my conviction is, on again perusing his letter,* that, for the time being, he was somewhat taken in also. . . . Nor did his memory serve him, I am sorry to say, a bit the more faithfully, when he wrote the following (l. c., p. 62): “*Mihi quidem submiserat apothecia heterogenea cum apotheciis ‘Lecanoræ subfuscæ,’ cujusdam immixta crescentia*,” etc.—The fact is that I only sent Dr. N. a few “halves” of isolated apothecia, all with fuscous spores, the existence of which I had taken care to ascertain by a microscopical examination of the halves corresponding. How is it, then, that, being under the impossibility of making any comparison whatsoever between the apothecia of the two species, from the inspection of “my” specimens, the learned author should have thought himself authorised to conclude his pamphlet with such a precise affirmation as the following:—“*Addatur, quod nullo respectu, nec externo nec anatomico, apothecia ambarum similitudinem quandam offerunt?*”

* Here is the passage alluded to of Dr. Nylander's letter:—“Vous avez assurément fait une bien singulière découverte en dénichant des apothécies du *Lecanora subfusca* dont les théques contiennent des spores brunes biloculaires. Qu'ont ces spores hétérogènes à faire dans cette galère? Un cas tératologique ou miraculeux de cette force ne m'était pas encore connu.” Be it observed that this was written on the 22nd of March, 1873, that is almost a year previous to Dr. N.'s writing (l. c., p. 63): *Examinatis quidem “hodie” apotheciis illis missis mox paluit, apothecis sporis fuscis prædita pertinere ad “Physciam aipoliam.”*

NEW AND RARE BRITISH FUNGI.

By WM. PHILLIPS AND CHARLES B. PLOWRIGHT.

(WITH PLATES 24 AND 25.)

We propose in this and subsequent papers to record the occurrence of such species of fungi not hitherto found in Britain as may come under our own immediate notice; also the occurrence in new localities of some of the rarer British species, which have already appeared in the invaluable series of papers by Messrs. Berkeley and Broome, in the "Annals and Magazine of Natural History."

1. **Diplodia Syringæ.** *And.* Fekl. Symb. Mycol., p. 395. Cooke's exs., Cent vii.

On *Syringa vulgaris*. - Shrewsbury.

2. **Ramularia armoraciæ.** Fekl. Symb. Mycol., p. 361. Thümen Herb. Mycol. Æconom., No. 27. On the leaves of horseradish. North Wootton, June, 1873.

3. **Ascochyta armoraciæ.** Fekl. Symb. Mycol., p. 388. Thümen Herb. Mycol. Æconom., No. 23. Cooke, Exs., Cent vii.

On horseradish leaves, North Wootton, Sept., 1874. Obviously a more advanced condition of the preceding.

* **Thecaphora hyalina.** Fing. On the fruit of *Convolvulus sepium*. King's Lynn. Dr. J. Lowe. C. B. P.

4. **Helminthosporium arundinaceum.** Corda. Ic. III. 10, tab. 2, fig. 25. Fekl. Symb. Mycol., p. 354.

On the leaves of *Phragmites communis*. King's Lynn, August, 1873, abundantly. Cooke, Exs., Cent vii.

5. **Peziza (Phialea) Strobilina**, Fr., S.M. II., p. 125. Rabh. F. E., 222. Krst. Pez. Asc., p. 30. Nyl. Pez. Fenn., p. 41.

Pyriform, firm, cupula concave, pallid, rufescent, margin tumid, entire; stipes short, black.

Sporidia oblong or fusiform, simple, $\cdot 0,008\text{--}\cdot 0,012 \times \cdot 0,0025$ millim. Nyl.

On fir cones. Derbyshire. (Mr. J. Renny.) North Wootton. C. B. P.

* **Ascobolus viridis.** *Curr. Lin. Trans.* xxiv., p. 154.

On a clay bank, Wrekin, Shropshire. July, 1873.

6. **Ascobolus atro-fuscus**, n. s. (*A. viridis*, Boud. Ann. Sc. Nat., 1869. x., t. 5, f. 4.?)

Sessile, crowded or scattered, blackish-brown, concave, then plane, margin crenulate, externally furfuraceous; asci clavate; sporidia broadly elliptical, obtuse, hyaline, then purple, at length brown, epispore granulated or verrucose; paraphyses linear, occasionally branched. Sporid. $\cdot 001 \times \cdot 0005$.

On a charcoal bed, the Wrekin, Shropshire. July, 1873.

We have little doubt of this being the same plant as that referred by M. Boudier (l. c.) to *A. viridis*, *Curr.*; it differs, how-

ever, so much in sporidia, colour, and habitat, from Mr. Currey's species that we venture to consider it distinct.

Plate 24, fig. 1. *a.* plants nat. size; *b.* section of one enlarged; *c.* ascus and paraphyses magnified; *d.* sporidia.

* **Ascophanus carneus.** Var. **Cuniculi.** Boud. Ann. Sc. Nat., 1869, t. 12, f. 39.

This differs from the normal form in its dirty-orange or orange-flesh colour, rather smaller size, paraphyses always colourless, and growing on rabbits' dung. Sporid. $\cdot 0006 \times \cdot 0004$.

Near Shrewsbury, Dec., 1873.

7. **Cenangium Laricinum.** Fekl.

Pycnidia. *Cenangium bullatum.* Alb. and Schw. Consp., p. 344.

c. Pinastri, *b. monstrosum*, Fr. Sys. M. ii., p. 184.

Cupula round, closed, then perforated, black, rugulose, stylospores long, filiform, slender, curved.

Ascophore. Fekl. Sym. Myc., p. 270.

Scattered or caespitose, as in *Cen. Pinastri*, but totally black; asci filled with spermatia-like corpuscles.

On larch poles. Near Shrewsbury. Nov., 1873.

8. **Sphæria (Sordaria) discospora.** Awd.—Perithecia scattered, minute, globose, with an obtusely conical ostiolum, covered by dense, black, short, rigid setæ, asci cylindrical, somewhat truncate at the apex, sporidia involved in mucus, subrotund. discoid, dark-brown or black, $\cdot 012$ m.m. ($\cdot 0004$ in.) in diameter, $\cdot 003$ – $\cdot 005$ m.m. ($\cdot 001$ in.) thick. Niessl. Beiträge der Pilze., p. 42. T. vi., fig. 44. Fekl. Symb. Mycol. Nachträg II., p. 43. Winter. Deutsch Sord., p. 19, t. VIII., f. 8.

On rabbits' dung. North Wootton. Dec., 1873. Known immediately by its disc-shaped sporidia.

Plate 25, fig. 2. *a.* plant magnified; *b.* asci and paraphyses, more highly magnified; *c.* sporidia separated from the ascus with their mucus envelope.

9. **Sphæria (Sordaria) breviseta.** Rbh. }

Sphæria (Sordaria) conica. Fekl. }

These two species have been united by Herr Winter in his monograph of *Sordaria*, as species and variety (*coronata*) of De Bary's *Sordaria curvula*. Not having seen authentic specimens, we think it best simply to record their occurrence without binding ourselves to any generic name. It is worthy of remark, however, that the presence or absence of one or both the appendages, even in the same perithecium, is liable to considerable variation. Appended is a list of references bearing upon the plants in question:—*Sordaria curvula*, De Bary. Morphol. der Pilze, p. 209; *Sphæria fimiseda* (De Not.), Fekl., Fung. Rhen., No. 2037; *Sordaria appendiculata*, Awd.; *Cercophora conica*, Fekl. Symb. Mycol., p. 245 & 243 (Sub. *Malinvernina breviseta*, Fekl.); *Ixodiopsis fimicola*, Kars., Fungi Fenn., No. 955; *Schizothecium fimicolum*, Corda, Icones, t. 11., p. 29; *Hedwigia*, No. 11, 1873. Winter, Deutschen Sordarien, p. 38, tab. XI., fig. 22.

10. *Sphæria carbonaria*. n. s.

Crowded, globose, semi-immersed, having an obtuse rugulose ostiolum, clothed at the base with branched septate hyaline threads; asci cylindrical, commonly truncate at the apex; sporidia almond-shape, dark-brown, with a very short hyaline tail, uniseriate; paraphyses linear. Sporid. $\cdot 0009 \times \cdot 0003$.

On burnt ground, near Shrewsbury, 1873.

This appears to be allied to *S. rotula*, Cooke.

Plate 25, fig. 3. *a.* perithecia in the ground, magnified; *b.* asci and paraphyses; *c.* sporidia; *d.* mycelium clothing the base of the perithecia.

11. *Sphærella Iridis*. *Gon. & Rabh.* Myc. Eur. t. 5. f. 71.

Amphiginous, black, at first covered by the epidermis, then somewhat free, scattered, depresso-globose, pierced with a simple minute pore; asci obovate-oblong, attenuated at the base into a short stem, sporidia 8, subtriseriate, oblong, rounded at the ends, straight, uniseptate, not constricted at the septum, epispore thick, $17 \times 4\text{--}5$ mic.

On dead leaves of *Iris pseudacorus*. Near Shrewsbury, Nov. 1873.

12. *Sphæria (Delitschia) Winteri*. n. s.

Perithecia immersed, spherical, black; ostiolum elongated, cylindrical, tuberculose, rugulose, frequently somewhat curved; asci cylindrical, octosporous. Sporidia involved in mucus, uniseptate, black-brown, elliptical.

On rabbits' dung. North Wootton, Dec., 1873.

The perithecia are completely immersed in the matrix, only the tip of the ostiolum being visible. The sporidia are at first greenish-yellow, then clear brown, becoming eventually almost black, when young surrounded by a gelatinous envelope, which subsequently disappears. They exhibit a tendency to fall in halves at the septum, $\cdot 003$ in. long by $\cdot 001$ in. wide ($\cdot 062$ m.m. $\cdot 028$ m.m.).

Dr. George Winter, to whom specimens were submitted, considers it distinct from all its allies, and adds, "it approaches nearest to *D. chaetomoides*, Karst., Fungi Fennici. Exs.

Plate 25. *a.* perithecia enlarged; *b.* ascus and sporidia; *c.* three sporidia.

13. *Cucurbitaria Dulcamaræ*. *Fr.* Fuckel Symb. Mycol., p. 175, Fr. S. V. S. p. 391.

Sphæria dulcamaræ, Kunze & Schm., Myc. Heft. i., p. 62. *Sphæriacei Brit. Cent. ii.* (inedit.)

On dead stems of *Solanum dulcamara*, in company with a *Hendersonia*, which doubtless bore some connexion with it, as a secondary form of fructification.

King's Lynn, Jan., 1874.

* *Stemonitis pulchella*. *Bab.* Cooke's "Handbook," No. 1160. Church Stretton, Salop, Dec., 1873.

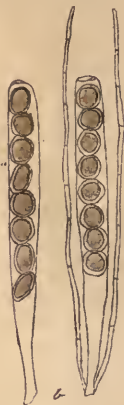
* *Peziza pustulata*. *Pers.* Cooke's "Handbook," No. 1986. Sporidia $\cdot 0006 \times \cdot 0003$. Tips of asci bright-blue with iodine. On charcoal beds, the Wrekin, Salop, 1873.

Plate 24, fig. 2, asci, paraphyses and sporidia, magnified.

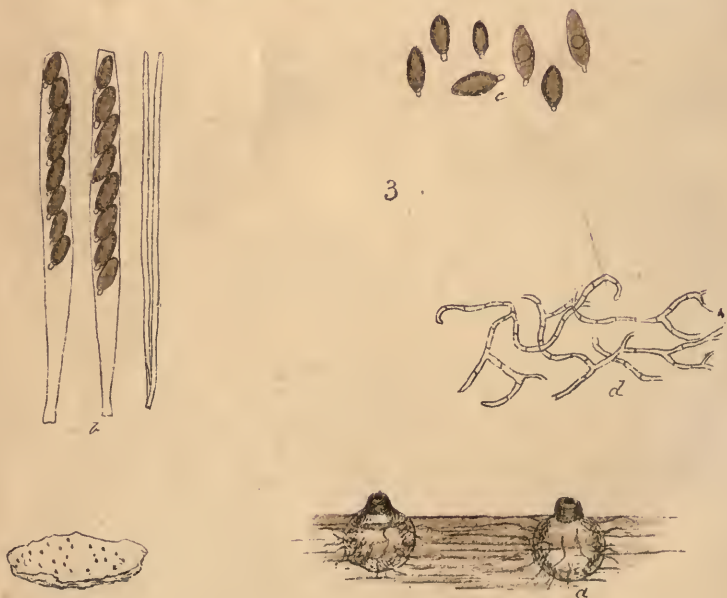
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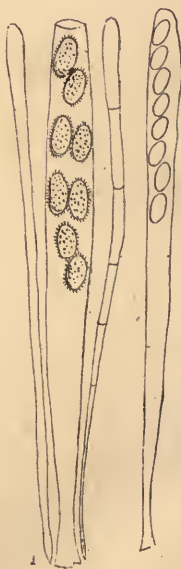
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* *P. Saniosa*. *Schrad.* Cooke's "Handbook," No. 1991.

The hymenium when wounded exudes a purple juice. The tips of the asci become blue with iodine. Sporidia $\cdot 0006 \times \cdot 0003$, with two or more nuclei.

This species is of very rare occurrence; one specimen only was found near the Wrekin, Salop, July, 1873.

Plate 24, fig. 3. Nat. size of plant with section; *fig. 2 f.*, ascus, paraphyses and sporidia.

GLYPHOMITRIUM DAVIESII.

Several years ago I took a deep interest in this moss and its distribution in Scotland. As the fruiting period occurs in May and June, I wish to draw the attention of bryologists more immediately to it.

In Wilson's "Bryologia" three stations were recorded—one each in England, Scotland, and Ireland—all of which were in the neighbourhood of the sea. Since then a considerable addition has been made to the Scotch habitats. The original station of Hooker and others had been either overlooked or neglected at Bowling. At the suggestion of Mr. Roger Hennedy, Lecturer on Botany to Anderson's University, Glasgow, we visited and found the station in May, 1863. An inspection of the place led to similar localities in the West here being visited with very satisfactory results, proving that it is much more widely distributed than was at first supposed. Our stations are now as follows:—

- 1.—Bowling, May, 1863, Messrs. Galt and McCartney.
- 2.—Whangie, New Kilpatrick, May, 1863, Messrs. McKinlay and Shaw.
- 3.—Killin, Perthshire, Mr. Alex. McKinlay.
- 4.—Ardtun, Mull, May, 1864, Mr. Donald Black, Iona, by request of Messrs. Galt and McCartney.
- 5.—Skye, 1864, Mr. G. E. Hunt, Manchester; and again in 1866 by Dr. John Shaw.
- 6.—Blairlogie, Stirlingshire, June, 1865, Mr. Geo. Thomson.
- 7.—Craigallion, Stirlingshire, March, 1868, Messrs. Thomson and Galt.
- 8.—Craggs, near Strathblane, Campsie Hills, March, 1868, by Messrs. Thomson and Galt.

This interesting moss has thus been found in the counties of Dunbarton, Argyle, Inverness, Perth, and Stirling. The attention of bryologists in other parts of the country should be specially directed to fallen basaltic rocks, and more immediately to those bared ones that are not overrun with other mosses.

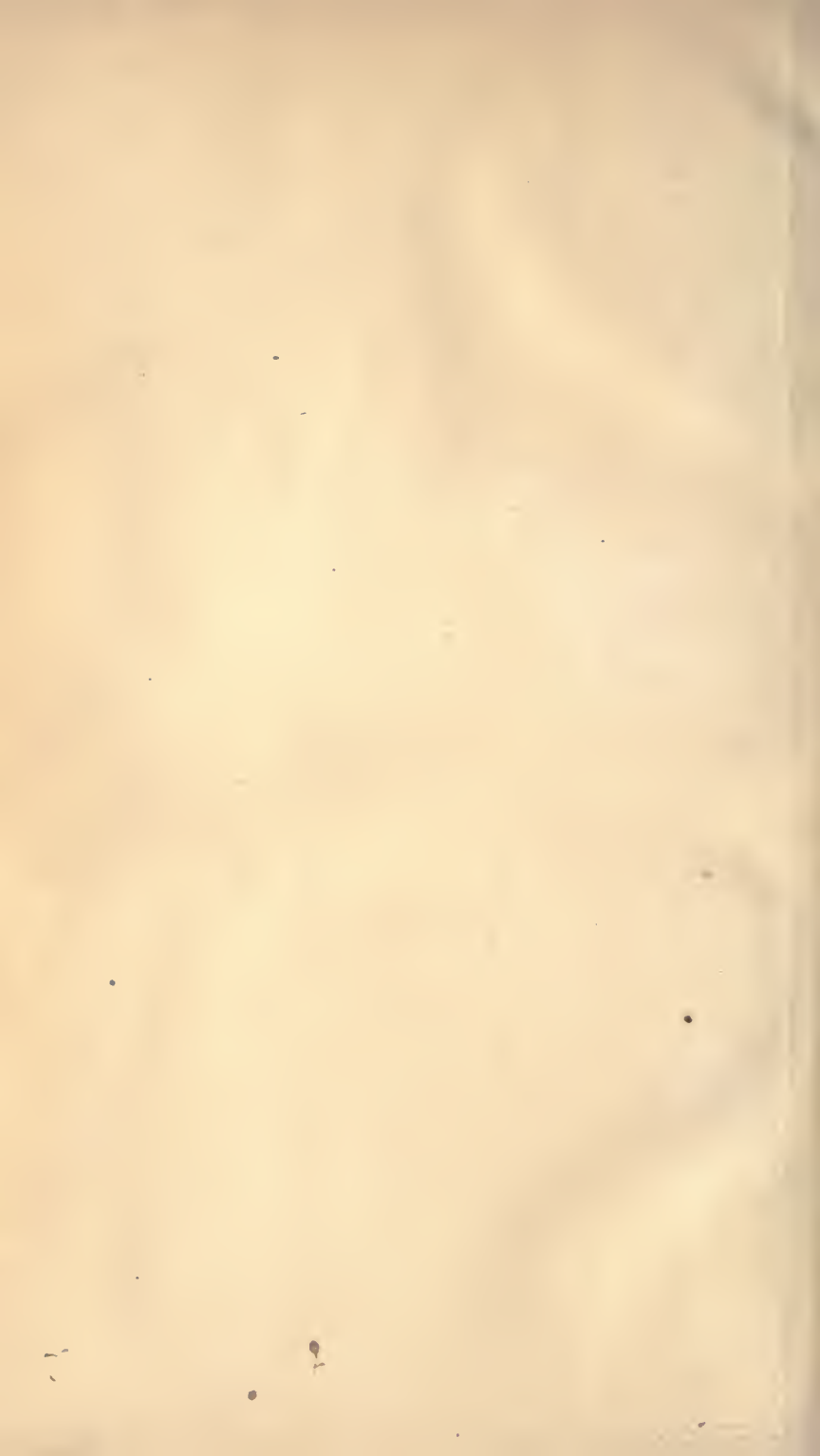
WALTER GALT.

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